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The Commodore C-128/C-64 Home Computing Guide

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September 1986 A CWC/I Publication

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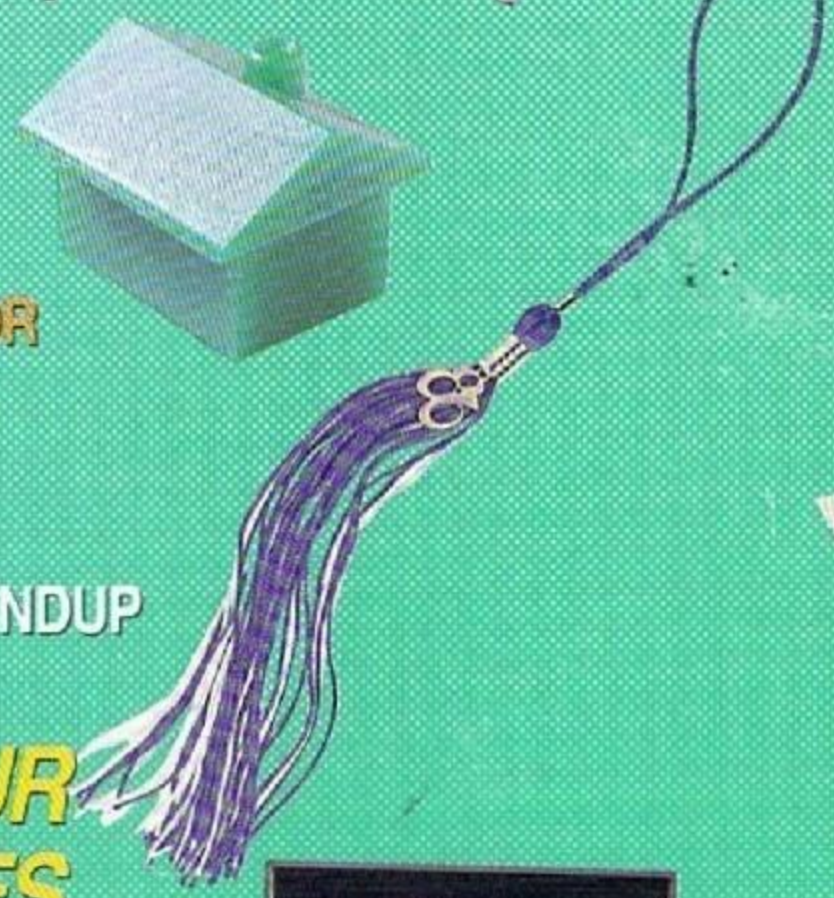

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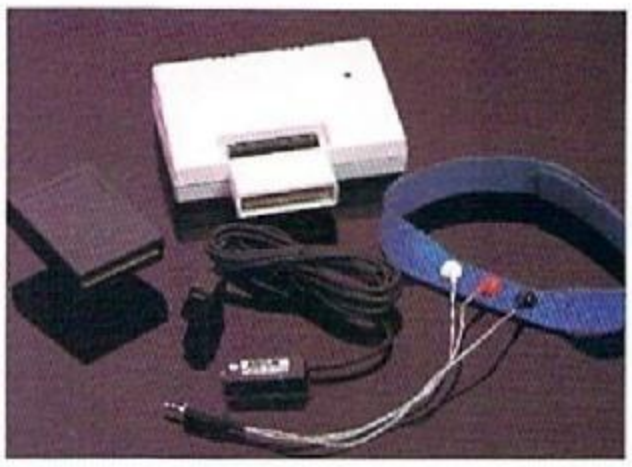

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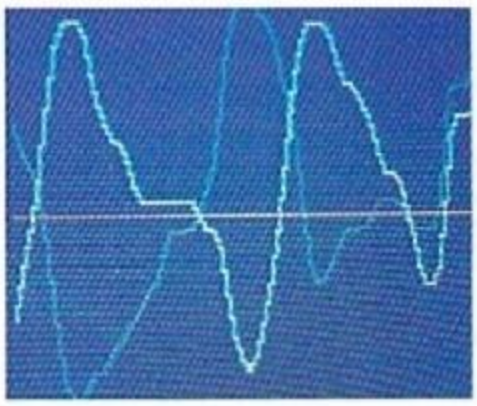

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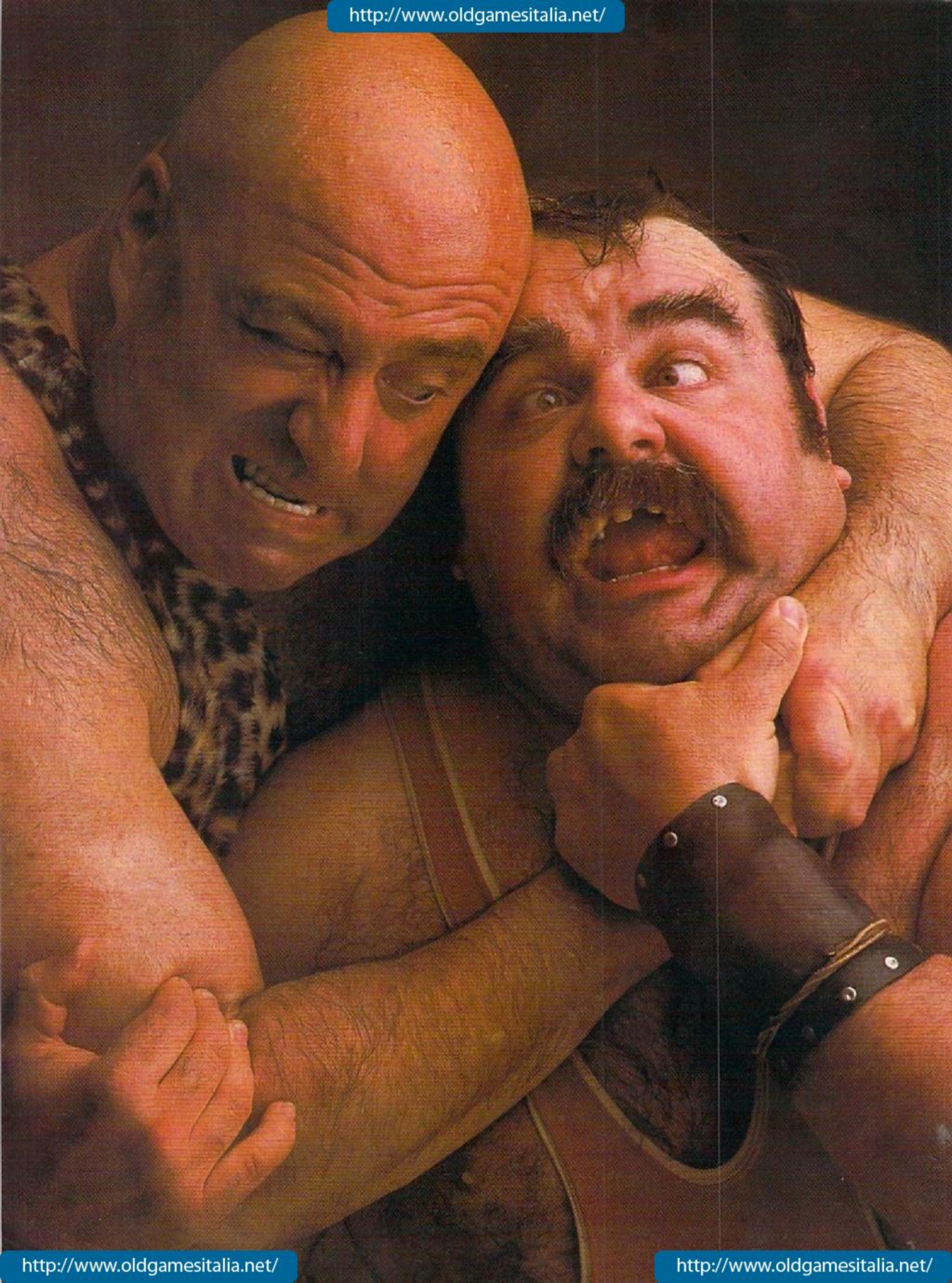

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There seems to be some disagreement as to which one of our Commodore® programs is the most fun.

Sometimes it's tough to make everybody happy all of the time. But that's not your problem.

Mindscape makes so many great Commodore® software titles you'll surely find at least one you have to get your hands on. Maybe two. Even three.

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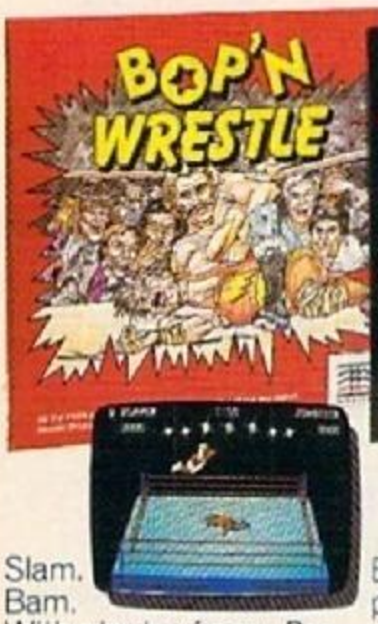
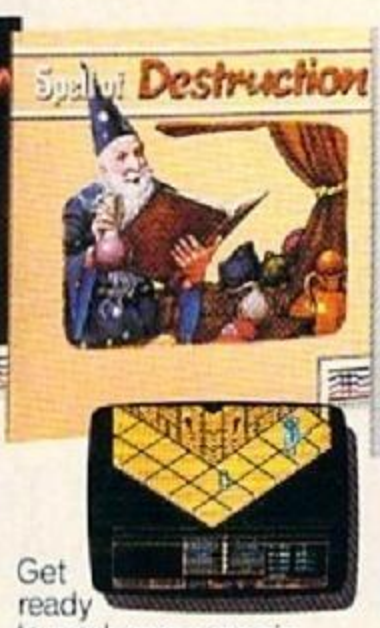


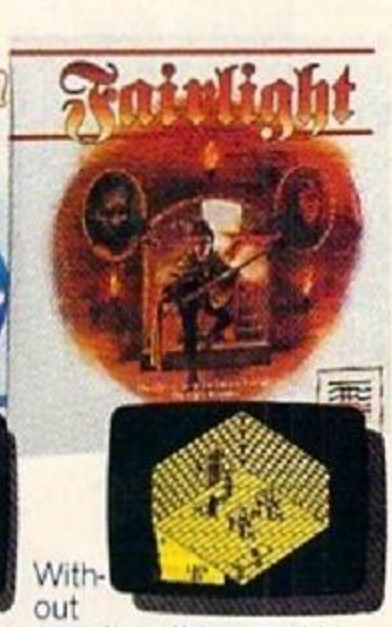
Slam. Bam. With plenty of pow. *Bop 'n Wrestle™* puts you in the ring with a crazy collection of bone crushers. For one or two players, this first truly 3-dimensional combat sports simulation lets you climb, gouge, and claw your way to the top of the heap. Drop kicks, full nelsons, and the turnbuckle fly have never been this much fun before.

Be prepared to take evasive action. In *Infiltrator™* by Chris Gray, you're Captain Johnny "Jimbo Baby" McGibbits, ace chopper jockey. Your mission is no day at the races. When you make it through hostile enemy airspace, this realistic flight simulation converts to covert ground-based animated graphic adventure. Now just destroy the mad leader and his angry troops. Thumbs up!



Get ready to work some magic. *Spell of Destruction™* makes you a wizard's apprentice inside the Castle of Illusions. You must find and destroy the Prime Elemental. You're armed with a supply of spells and fireballs, but there are plenty of lessons to learn before you pass the Loremaster's challenging trial. Music and 3-dimensional graphics of 70 eerie locations make this adventure truly awesome.

Hoist a sail on your monitor. And sit down at the keys. *The American Challenge: A Sailing Simulation™* will make you a better sailor in a few short strokes. Race against the program, another skipper head-to-head, or via modem from coast-to-coast. When you've mastered the basics you're ready to meet the Aussies and reclaim The America's Cup. Set your sails and your sights on the waters of Silicon Bay.



Without question, this quest is for you. *Fairlight™* combines magic, adventure, strategy, and action as you meet the challenge to find the Book of Light. You're in a far away and ancient land. But 3-dimensional high-resolution graphics make it all seem real. This epic will grab you. Only the strong and resourceful will conjure up the courage it takes to survive.

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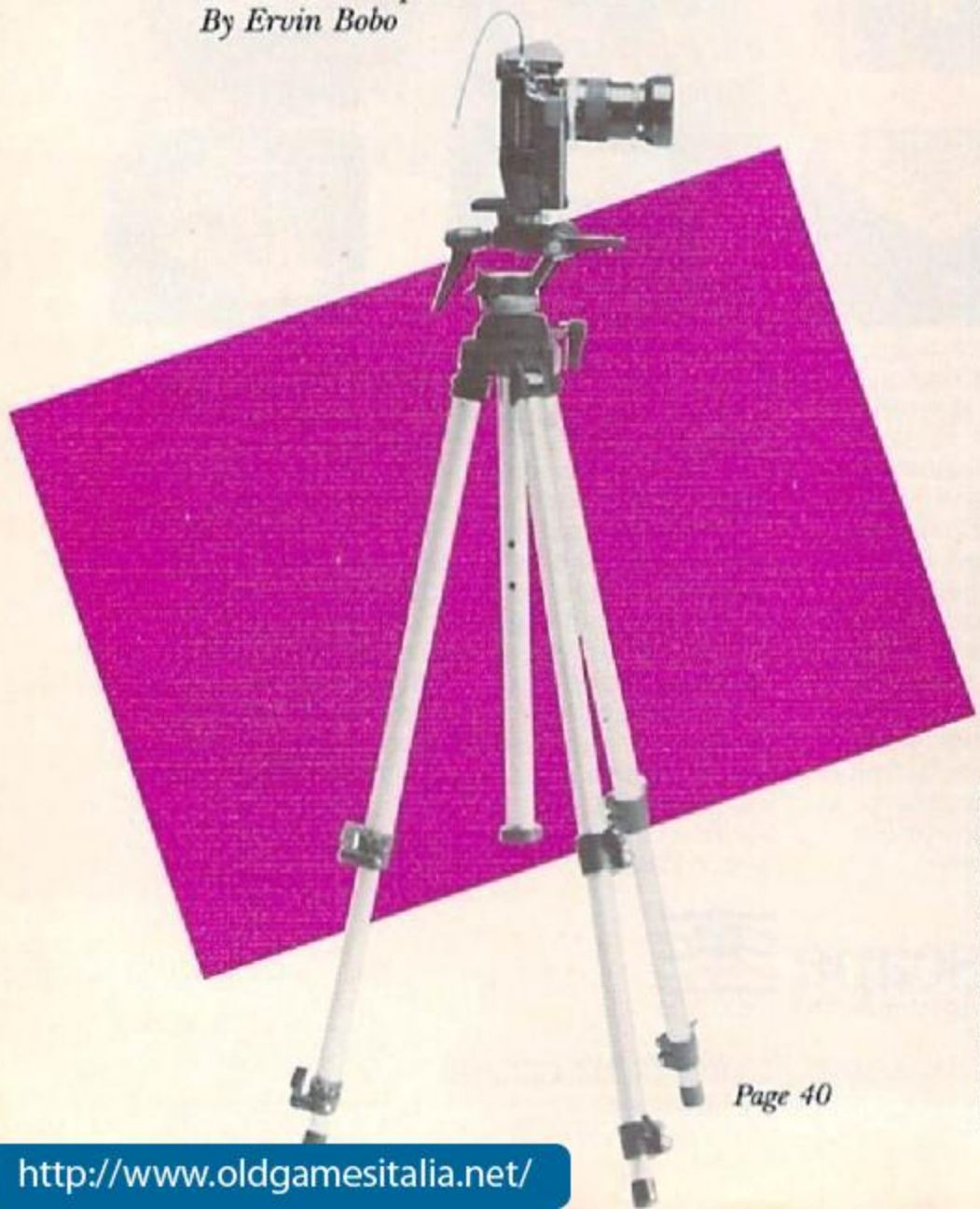

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If you own a C-64, you

The one you purchased. And the

GEOS realizes the technical potential that has been in the C-64 all along. Speed. Power. Ease of use. Sophistication. Elegant, practical applications you might expect of a high-end personal computer, all made possible with GEOS. It's so simple—but then, so was fire. Once it caught on.

To begin at the beginning. **GEOS** stands for **GRAPHIC ENVIRONMENT OPERATING SYSTEM.** Why?

GRAPHIC: Because menus and icons replace long, typed command lines. Point and click, that's it.

ENVIRONMENT: Because GEOS provides a consistent, powerful way to use your computer. Learning new applications is a snap (or should we say click).

OPERATING SYSTEM: Because GEOS orchestrates every function so that they all work together systematically, even symphonically.

Some basics. Icons are graphic images which represent files or utilities. Each is different, and all are easy to recognize and easy to use.

A menu is just that: a list of functions available for selection. When a menu appears, move the pointer to any item you wish. Click. Click. You're on your way.

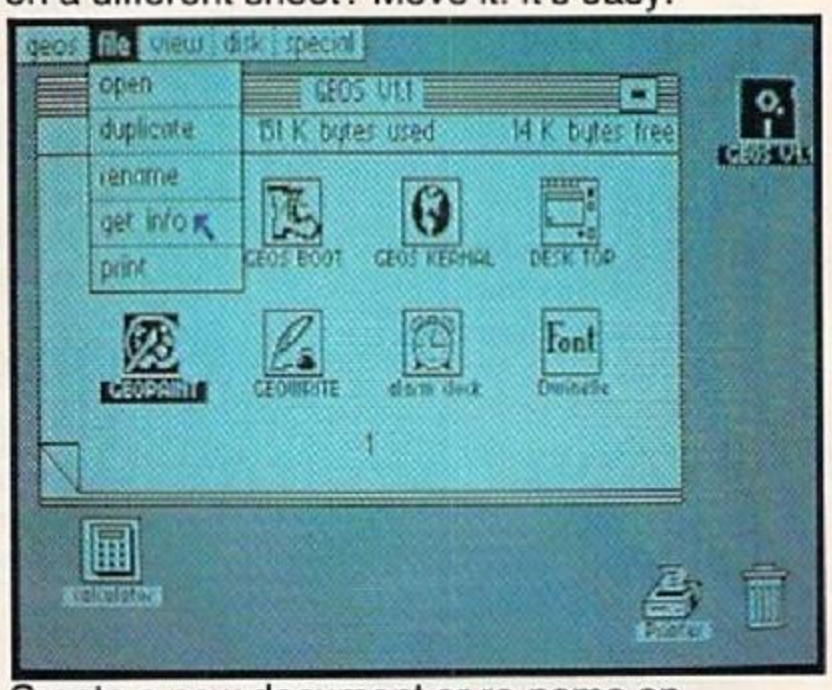
A pointer is used to select and activate items. To move the pointer, roll the mouse or trackball or rotate the joystick. Once on target, click once to select; click a second time to activate.

Fonts are a new way of looking at text. Choose from 5 different fonts (with more on the way). Try Dwinelle, or Roma, **bold,** or *italics,* even underline and outline. Need to fit more words on a line? Pick a smaller point size, like University 6 point, and get over one hundred characters per line.

All this and fast too. Because the integrated diskTurbo software improves 1541 disk drive performance 5 to 7 times. That's right. On both reads and writes.

GEOS can be divided into 4 areas: two functional aspects (deskTop and Desk Accessories), and two major applications (geoPaint and geoWrite).

deskTop. deskTop is a graphic interface, making file organization and management easy. As always, you call the shots. Load a disk. Files appear as icons on the disk notepad; to flip through, point at the folded corner and click. Prefer a file appear on a different sheet? Move it. It's easy.



Create a new document or re-name an existing one. Want to copy a file onto the same or a different disk? Fine. Forgotten what a file contains? Select "get info" from the file menu. A description of that file's contents appears. Finished with a file? Print it. Save it. Or drop it in the trash and have done with it. Your call.

geoPaint. A full-featured, color graphics workshop at your fingertips. The pointer operates any one of the fourteen graphic tools and shapes in the drawing menu. Create masterpieces on the Drawing Window. By turns, use a pencil, an airbrush or a paint brush, each with a character all its own. Draw straight lines, squares, rectangles or circles. Fill in with any of the 32 patterns. Switch to pixel-mode, where each dot in a selected section is magnified many times its size for easy manipulation.

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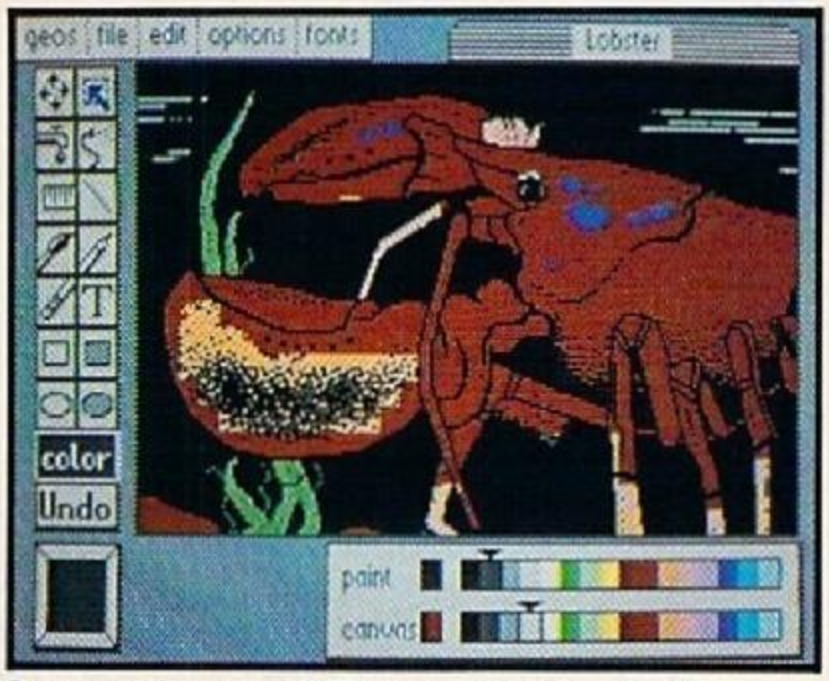
own two Machines.

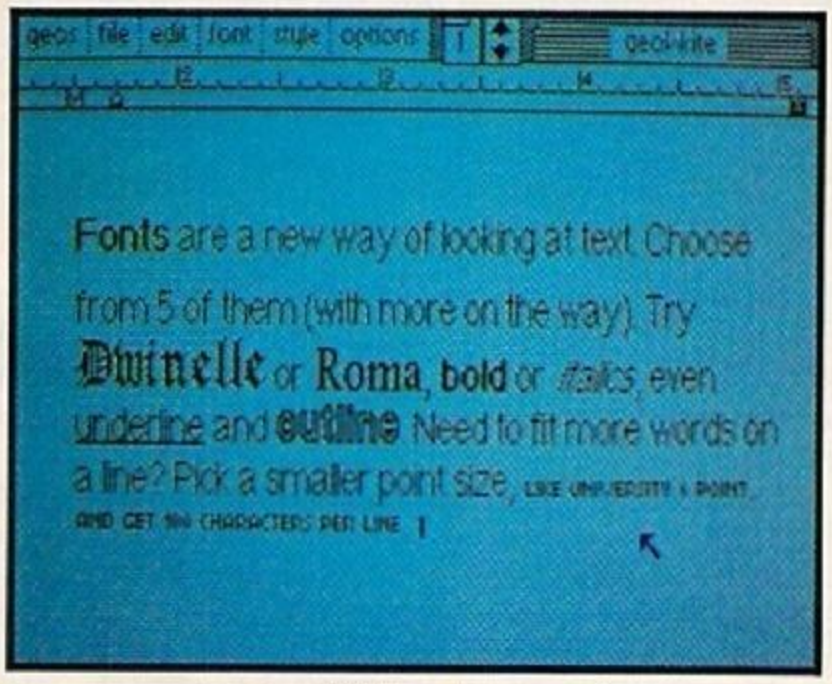
personal computer GEOS™ unlocks.



Second thoughts? Erase what you don't want. Or "UNDO" your last act. (If only life could imitate art!)

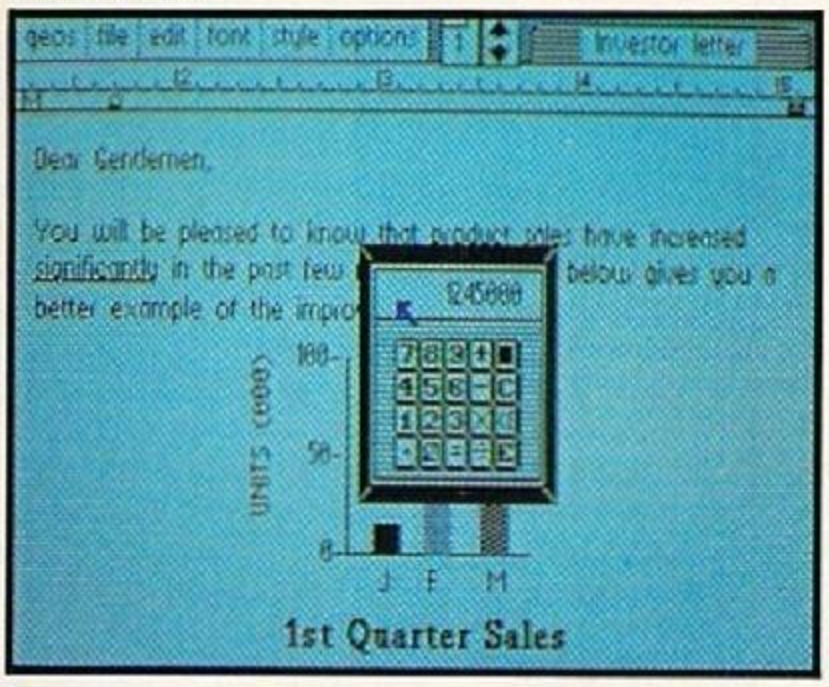
Add text if you like, in different fonts, styles or point sizes. Even change its position or layout at will.

Move or copy any part of your creation. Once done, you can include your artwork in another document—a letter home perhaps. (Won't Mother be pleased?) GEOS makes it easy.


geos file edit font style options
geoWrite
Fonts are a new way of looking at text. Choose from 5 of them (with more on the way). Try Dwinelle or Roma, bold or italics, even underline and outline. Need to fit more words on a line? Pick a smaller point size,

geoWrite. An easy to use, "what you see is what you get" word processor. Create documents. Insert, copy, move or delete text as you wish. Choose from 5 different fonts in many different styles and point sizes. Preview your page exactly as it will appear off the printer. Typists will appreciate tabs, word-wrap and page breaks.

Documents may contain up to 64 pages. What's more, you can move to any page instantly. If you like, you can cut selected text from one section and move or copy it to another. Add graphics from geoPaint. It's a cinch.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You will be pleased to know that product sales have increased significantly in the past few
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Desk Accessories. Handy programs you can use while in any GEOS application. These include an alarm clock, a notepad for reminders, a four-function calculator, and photo and text albums which store pictures and phrases you may then paste into applications. The Preference Manager even lets you establish parameters for everything from mouse speed to the date and time—even background color. Civilized options, every one.

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GEOS Diskette includes deskTop, diskTurbo, geoPaint, geoWrite and desk Accessories $59.95.
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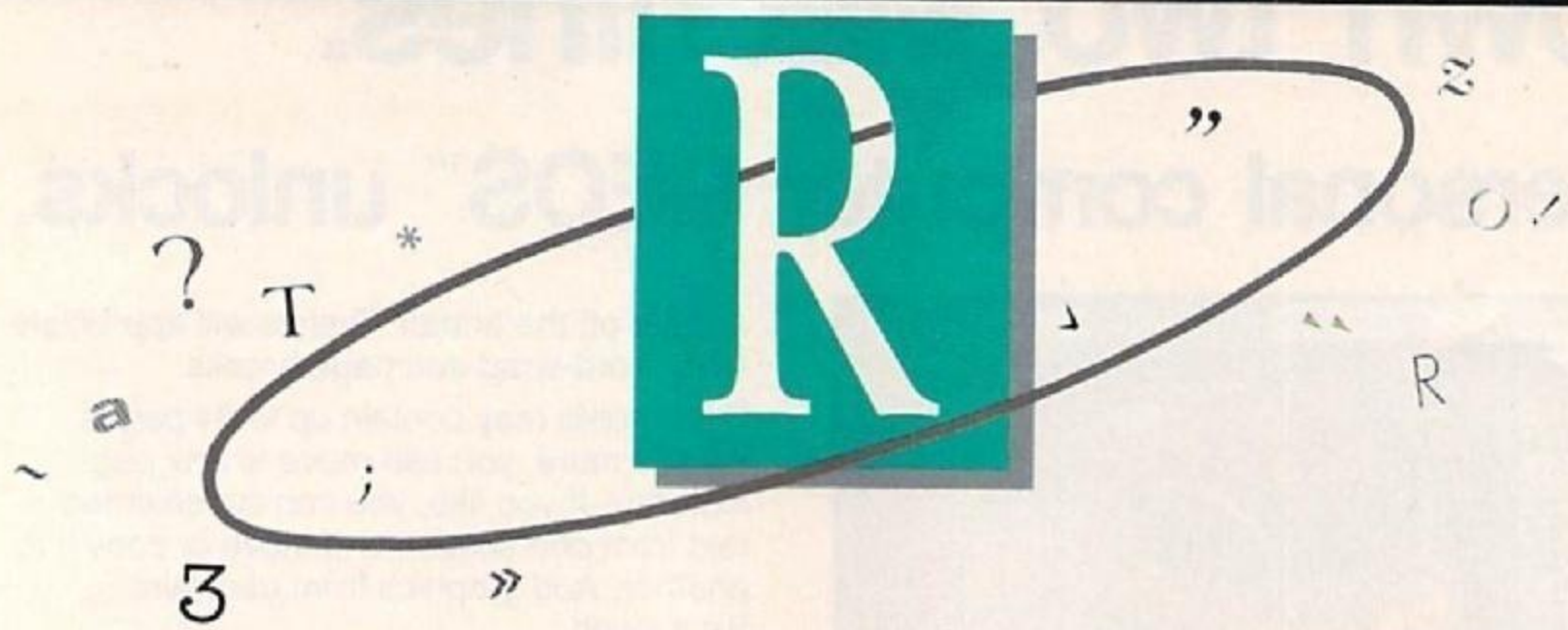

RUN's Third Annual Special Issue

Each year *RUN* readers anxiously anticipate the arrival of the *RUN* Special Issue, and, quite frankly, it wouldn't take too much prodding for us to continue this publishing tradition. Reader enthusiasm is matched only by the editors' enthusiasm and pride in soliciting and preparing the best material for this project. It's an exciting time, and this excitement is reflected in the quality of the product.

Reader feedback regarding *RUN*'s two previous special issues has been very positive and also extremely valuable in helping us fine-tune the editorial content of these issues. Reader input indicates that the type of useful information in the special issues has a wide appeal.

This year, we've kept the most popular features of previous issues and added new features that are sure to satisfy the needs and interests of C-64 and C-128 users. The demand for the kind of information that the special issue contains is strong among Commodore users. And this year's special issue promises to be the best yet. To assure this, we have recruited some of the best talent in the Commodore industry to contribute to this issue.

The lineup includes:

—The best of Commodore Clinic. A collection of approximately 200 answers to the most-often-asked questions regarding Commodore computing. Compiled by industry expert and author, Jim Strasma.

—The best of Magic. Page after page of computing hints and tips. This extensive section (about 250 tricks) will include the best of the past year, as well as never-before-published tricks developed especially for this issue. For your easy reference, these tricks are indexed and organized by topic.

—In addition, we have asked some of the biggest names in the industry to provide their favorite computing tips for our readers to use and call their own.

—Free Wall Chart. As a special service to our readers, this pull-out wall chart will feature hard-to-find programming information, including Basic 2.0 and Basic 7.0 memory maps, machine and assembly language information and system commands and functions.

—For application users. New this year will be a collection of the most useful utilities and applications programs. These brief, one-page program listings will be easy for anyone to type in, save and add to his or her software library. C-64 and C-128 programs will include powerful utilities, as well as useful applications for home use.

—*RUN* index. For readers who are looking for more information about a particular topic, the special issue will also include a handy index of programs and articles published in *RUN* during 1986.

This year's special issue offers readers information that is not available anywhere else in such a concise, easy-to-use package. Whether you're a new or experienced owner, a programmer or applications user, you'll find plenty of useful information here—well-organized and attractively packaged in an issue that readers will refer to throughout the year.

Although the copies of this year's special issue will not hit the newsstands until the end of this year, it is not too early to think about placing your order. In previous years, the *RUN* special issues have sold quickly, so get your order in early through the ad that will appear in next month's issue.

Please be sure to let us know how you enjoyed it, and how it compares to previous issues. As always, we welcome your comments, suggestions or criticisms.

Productivity Pak II

While on the topic of special products from *RUN*, I'd like to mention another project that the editors are working on. It's the Productivity Pak II, a compilation of some of the most productive applications for the Commodore computerist.

Productivity Pak II, available at the beginning of October, will feature word processing, database management, spreadsheet calculation, telecommunications, utilities, applications and more. The disk will contain new and improved versions of *RUN*'s most popular programs: RUN Script, RUN Term Plus and the Datafile series. In addition, the 64 disk will include graphics and handy utility programs.

C-128 owners looking for productive programs will also find them in this special disk: RUN Script 128, a powerful 80-column word processor; Reminder 128, a handy desktop accessory; Gradebook Manager; Music Construction Set; and Menu 128.

For more information on ordering your copy, see the convenient order form in next month's issue.

db

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A Message from The Publisher

In the past three issues of *RUN*, we have brought you feature stories highlighting or previewing the most recent product developments from Commodore for users of C-64 or C-128 computers. Now that you've had the chance to read the June, July and August issues, you have the perspective to see how these developments reflect Commodore's plans for both its installed base and new users.

It is apparent that Commodore's overall strategy in announcing these new developments is twofold: first, to provide first-time computer buyers with a complete computing solution, consisting of immediate applications, an easy-to-use operating environment and a simple entry to the world of telecommunications; second, to give experienced users additional hardware and software capabilities for their computers and a unique on-line service that opens up new possibilities.

The first strategy is achieved by bundling with the new 64C the GEOS operating system (with the GeoWrite and GeoPaint applications), the Q-Link terminal program and one educational application. The second strategy has been addressed through hardware-expansion products and telecommunication services that break new technological ground.

Many of you are now familiar with the collaborative effort between Commodore, QuantumLink and Lucasfilm, but you may wonder what brought these well-known companies together. The answer lies in the fact that QuantumLink is the only on-line service that supports the 64's and 128's locally generated graphics and sound.

Commodore learned that Lucasfilm had been working on the Habitat concept (see *RUN*'s August issue) for some time, but with no success in bringing the project to fruition. To do so, Lucasfilm needed both development funding for the project and an on-line service using locally generated graphics and sound. The combination of Commodore with the C-64/C-128 and QuantumLink provided the way for Habitat to become a reality.

Commodore users can expect more new services from QuantumLink in the future, and Commodore also has several additional hardware enhancements planned. According to company officials, the 1581 3.5-inch disk drive and the new mouse will be available later this fall.

With regard to GEOS, our most recent subscriber survey reveals that even before our June story on the new operating system, over a third of *RUN*'s subscribers had heard of it. However, when asked if they planned to purchase GEOS, over half of our readership was unsure. *RUN*'s feature story on GEOS in the June issue brought you up to date about the product and should help you make a good decision on purchasing it. Your decision may be influenced by the fact that many productivity software publishers have embraced GEOS, so we can expect new GEOS-based and GEOS-compatible products in due time.

So far, the general reaction to GEOS has been positive. For example, many user groups are excited about its desktop publishing potential, and, according to Berkeley Softworks, they can look forward to the appearance of expanded GEOS publishing capabilities later this year. Programmers, however, are thus far not happy with GEOS, because there is as yet no software to let them program this new operating system. This actually poses to programmers the unique challenge of developing a solution to the problem.

Berkeley Softworks will publish the programmer's reference manual in the fall, and by year-end will introduce GeoBasic, which will allow programmers easy access to the DOS text and graphics capabilities of GEOS. Indeed, there have been several suggestions for a CLI (command line interpreter) program, or "shell," to use over GEOS, instead of the current icon desktop.

We look forward to more of your feedback on these new developments.

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Hints and tips for Commodore users

Magic is the original *column of reader-submitted hints and tips. Each month we present brief, useful computer "tricks" to help you get the most out of your Commodore computing system—whether you're a beginning or advanced computerist, a C-64 or C-128 owner. Magic is a forum for* RUN's *imaginative and inventive readers to share their programming tips, brief software or hardware modifications, shortcuts or items of general interest. If you have an idea to make computing easier, faster, more exciting and enjoyable, send it to:*

Magic
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If your trick is accepted for publication in the column, you will receive a colorful RUN Magic T-shirt.

"School is Open" is a chant often heard in September, and students wish they also had a chant to make their school system disappear. But alas, this month we have no tricks to exorcise the effects of the first chant, nor a trick to make teachers vanish.

However, we do *have a few tricks to help make studying your school subjects a bit easier. First try the many tricks that are available in books on expanding* your *memory. Then try the magic trick in this month's column that expands the memory capacity of* RUN's *popular datafile program on your C-128.*

If you're lucky enough to have a copy of RUN Script 64 for typing term papers, you also have a way of copying machine language codes. And, when you've finished the homework assignments that take up so much of your time, use the tricks contained herein to save you time typing in programs and Data statements on your C-128.

Come to think of it, this month's tricks will help make your new school year a pleasant experience!

$322 Colossal Datafile on the C-128—The C-128 greatly expands the memory capacity of Mike Konshak's Datafile program (*RUN*, November and December 1984). Since the unexpanded C-128 has over three times the available RAM of the C-64, your files can be much larger.

In line 23 of the original Datafile program, simply increase the value of variable M from 30,000 to 60,000. *Presto!* You've got a Datafile 128!

James Adams
Indianapolis, IN

$323 A faster colossal Datafile—After making the above change to Datafile, you can double the speed of RAM operations by adding the Fast command either to the first line of the Datafile program or as a new line at the beginning of the listing.

You must have an RGB cable connected between the C-128 and the video monitor to use this feature, since the Fast command deactivates the 40-column screen.

James Adams
Indianapolis, IN

$324 Restructuring DFRestructure—In Mike Konshak's DFRestructure program (*RUN*, November 1985), changing line 4784 to MEM = 60000: RL = 0 increases the number of entries you may enter into your files. Now load the old file and either rename the field or increase the length of the field by one character. When you resave the file, you'll have more space for entries.

Clarence F. Cragin
Cottage Grove, MN

**$325 C-128 and Plus/4 screen code decoder**—This short Basic program converts screen codes to their equivalent CHR$ codes and displays the value represented by each character.

```
10 REM C128 & PLUS/4 SCREEN CODES - MARTIN
   GELB
15 PRINT"{SHFT CLR}":CHAR,6,1,"{CTRL 9}SCRE
   EN CODE TO CHR$ CODE":PRINT
17 PRINTTAB(10)"{2 CRSR DNs}{CTRL 0}RUN/STO
   P TO STOP":PRINTTAB(10)"CONT <RETURN> TO
    CONTINUE"
20 FOR S = 1 TO 128
25 A=(S AND 127)OR(S AND 32)OR((S AND 64)*2
   )OR((64-SAND32)*2)
```

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Listing continued.

```
3Ø PRINT:PRINT"{HOME}{7 CRSR DNs}SCREEN COD
   E";S;"{2 SPACEs}CHAR ";CHR$(A);" CHR$ CO
   DE";A
4Ø FORT=1TO5ØØ:NEXT:NEXT
5Ø PRINT"{SHFT CLR}{CTRL 9}THE END":LIST
```

Change line 20 to INPUT"SCREEN CODE"; S and line 40 to GOTO 20 to inspect individual screen codes.

Martin Gelb
Deerfield Beach, FL

$326 Entering C-64 programs in C-128 mode—When typing in Basic C-64 programs, use the C-128 mode in order to take advantage of Basic 7.0's editing features and the 1571's rapid disk access. When you're finished, save the program. It should load and run without trouble in C-64 mode.

Richard W. Clark
Barrow, AK

$327 C-128 onions and Data statements—Chopping onions and typing Data statements are jobs no one likes to perform. The best method for performing these tasks is to assign them to others, thus avoiding spilling your own tears. But, if you must do these jobs yourself, wear goggles before chopping the onions, and type in Data statements using the C-128's Auto feature and programmable function keys. When you're ready to enter the line number of the first Data statement, enter in Direct mode, KEY 1,"DATA":KEY 3,",":AUTO(line-number increment) and press the return key.

To best utilize the C-128's numeric keypad and the reprogrammed function keys, you must position your fingers properly on the keys. The index finger operates the 0, 1, 4, 7 and F1 (data) keys. The middle finger also may operate the 0 key, as well as the 2, 5, 8 and F3 (comma) keys. The ring finger operates the decimal, 3, 6 and 9 keys, and the little finger is used to press the enter, minus and plus keys.

Eric Pickell
Palatine, IL

$328 Up, up and away C-64—Whoever said piloting a hot-air balloon was easy? Windspeed, the rate of ascent and descent, the balloon's fuel consumption and the navigation of the contraption all add up to create a pilot's nightmare. This program opens with the balloon rising from the bottom of the screen. The balloon's buoyancy is controlled by alternately pressing and releasing any key until you alight on the landing pad at the opposite end of the screen.

Obstacles have been placed in the sky to keep your journey to the landing pad challenging. While keeping an eye on the fuel gauge at the top of the screen, navigate over the first obstacle, under the second and then land on the pad. Avoid hard landings and bypassing or colliding with anything on the screen.

Although it is unlikely you'll want to do so, the level of difficulty can be increased by changing the wind speed, fuel allotment and obstacle locations (L1 and L2) in the first line of the program.

```
1Ø PRINT"{SHFT CLR}UP, UP AND AWAY - THE SN
   ADERS":FUEL=25Ø:WIND=2Ø:L1=1395:L2=1724
2Ø X=4Ø:Y=228:B=1:V=53248:POKE1612,68:POKE2
   Ø4Ø,13:POKEL1,42:POKEL2,42
3Ø FORT=ØTO7:READQ,D:POKEV+Q,D:NEXT:FORT=83
   2TO895:READQ:POKET,Q:NEXT
4Ø IFPEEK(197)<>64THENA=-.Ø3:FU=FU-1
5Ø B=B-A:Y=Y-B:POKEV+1,Y:X=X+WI/5Ø:POKEV,X:
   A=.Ø3
6Ø IFPEEK(V+31)=1ORY>229ORX>25ØORFU<ØTHENPR
   INT" GAME OVER - TRY AGAIN!":END
7Ø IFX>239ANDX<243ANDY>141ANDY<145ANDB>-.5A
   NDB<.5THENPRINT"NICE LANDING!":END
8Ø PRINT"{HOME}{CRSR DN} FUEL{4 SPACEs}{4 C
   RSR LFs}";FU:PRINT" BUOYANCY{4 SPACEs}{4
    CRSR LFs}";INT(B*1ØØ):GOTO4Ø
9Ø DATA 21,1,28,1,31,Ø,32,2,33,1,37,12,38,2
   ,39,7
91 DATA ØØ2,17Ø,128,Ø42,17Ø,168,17Ø,17Ø
92 DATA 17Ø,234,234,234,234,234,234,187
93 DATA 187,187,187,187,11Ø,174,173
94 DATA 11Ø,174,173,Ø74,17Ø,161,Ø18,17Ø
95 DATA 132,Ø18,17Ø,132,ØØ4,17Ø,Ø16,ØØ4
96 DATA 17Ø,Ø16,ØØ1,Ø4Ø,Ø64,ØØ1,Ø4Ø,Ø64
97 DATA ØØØ,Ø65,ØØØ,ØØØ,Ø65,ØØØ,ØØØ,Ø85
98 DATA ØØØ,ØØØ,Ø85,ØØØ,ØØØ,Ø85,ØØØ,ØØØ
```

Bob Snader and David Snader
Baltimore, MD

$329 C-64 windows—Have you ever dreamed of writing a Basic program with pull-down menus for your C-64? The following program creates a window for each pull-down menu needed. Variable C determines the color of the window, Y1 is the number of lines down from the top of the screen, X1 is the number of spaces from the left side of the screen, X determines the column width of lines within the window, and Y is the number of horizontal lines in the window. The cursor is placed at the upper-left corner of the screen after the program is run.

Try substituting new values for the above variables to create fast, professional-appearing pull-down menus on your C-64.

```
1 REM C64 WINDOWS - ARAN ANDERSON
1Ø C=1:Y1=3:X1=5:X=5:Y=1:GOTO5ØØØ
2Ø C=C+1:Y1=Y1+2:X1=X1+3:X=X+2:Y=Y+3:IFC=6T
   HEN 5Ø5Ø
5ØØØ POKE646,C:PRINT"{SHFT CLR}";:IFY1=ØTHE
     N5Ø1Ø
5ØØ5 FORI=1TOY1:PRINT:NEXT
5Ø1Ø PRINTTAB(X1);"{SHFT U}";:FORI=1TOX:PRI
     NT"{SHFT *}";:NEXT:PRINT"{SHFT I}"
5Ø2Ø FORI=1TOY:PRINTTAB(X1);"{SHFT B}";:FOR
     J=1TOX:PRINT" ";:NEXT:PRINT"{SHFT B}":
     NEXT
5Ø3Ø PRINTTAB(X1);"{SHFT J}";:FORI=1TOX:PRI
     NT"{SHFT *}";:NEXT:PRINT"{SHFT K}"
5Ø4Ø PRINT"{HOME}";:GOTO2Ø
5Ø5Ø PRINTTAB(19)"{CTRL 2}{1Ø CRSR DNs}INSI
     DE THE ":PRINTTAB(21)"WINDOW{COMD 7}"
```

Aran Anderson
Pocatello, ID

Continued on p. 96.

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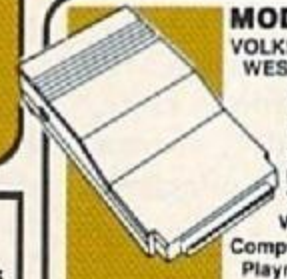

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Compiled by HAROLD R. BJORNSEN

Fight Night

Create a Boxing Contender Who's a Knockout in the Ring

Latest in a series that almost redefines the computer game, Fight Night, like other games from Accolade, combines strategy and arcade action, clothed in good graphics and enhanced by excellent sound effects.

Using a quick-boot system that really works, Fight Night presents you with a menu of five choices. For arcade-type action, go directly to Boxing. The computer will pick one of the lower-ranked boxers from its stable.

Above the ring, an inset shows profiles of both boxers (you're the clean-cut guy) as well as the round number, point scoring and the minutes and seconds remaining in the round.

All action is controlled by the joystick, and it may take several rounds for you to become adroit at faking or throwing jabs and body blows, raising or lowering your guard or moving right or left.

As you land blows, your score increases, and your opponent's "KO" bar goes up. Get it up to maximum and you've scored a knockout. On the other hand, blows landed by your opponent will. . . you guessed it.

Maybe you should have trained first, or, better yet, should have built yourself a powerful boxer capable of withstanding great punishment.

You do this in the Construction mode, building a contender from the head down, selecting from various body types, and then a set of legs ranging from spindly to huge. Then you must give your contender strengths (should his jab or body blow be the more powerful?) as well as weaknesses (giving him a high resistance to head blows means he is more vulnerable to body blows). You can't have everything, and you can't put a superman in the ring. In any event, the boxer you create may be saved to the master disk and, if necessary, be modified later on.

With your contender constructed, you can now go into training. Here, you practice joystick control at your own speed, observing the effects of your moves in the actions of your boxer against a punching bag. When you think you have it under control, go to the Spar mode.

Here you can call up any two boxers you've created. You and a friend can fight them, or you can let the computer control both boxers, giving you the chance to observe the good and bad points of your contender and modify him before he goes into the tournament.

In the tournament, you construct a series of fights for your contender, and it's probably best to start him out against the lower-ranked fighters and let him work his way up through the ranks. Keep in mind that your opponents also have their strengths and weaknesses and that each of them has a special super punch that can end everything for you.

Fight Night's documentation is good, and you are given detailed profiles of each of your computer-controlled opponents as well as tips and strategies to use against them. These tips are not going to give you the upper hand, but they may allow you to hold your own for a while longer.

As with everything else I've seen from Accolade, graphics and sound are great, and play value is high. In Fight Night, graphics are so detailed that even facial expressions seem to change. And it is a game that you can play against the computer or against a friend, giving it more flexibility than is usual in games of this type. I give it high marks on every count. *(Accolade, 20863 Stevens Creek Blvd., Cupertino, CA 95014. C-64/$29.95 disk.)*

Ervin Bobo
St. Peters, MO

Report Card

A ***Superb!***
An exceptional program that outshines all others.

B ***Very Good.***
One of the better programs available in its category. A worthy addition to your software library.

C ***Good.***
Lives up to its billing. No hassles, headaches or disappointments here.

D ***Mediocre.***
There are some problems with this program. There are better on the market.

E ***Poor.***
Substandard, with many problems. Should be deepsixed!

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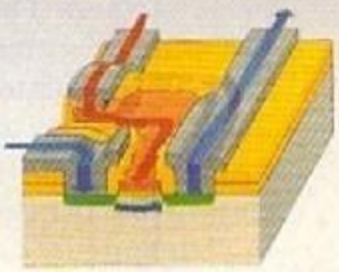

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The Body in Focus

A

Peel Away Secrets Of the Human Body

Have you ever seen the anatomical models that doctors use to explain the inner workings of the human body? Usually a layer of plastic skin is removed to reveal plastic muscles and organs that fit tightly in place around plastic bones.

With The Body in Focus, CBS Software has created a computerized model of the human body that you can take apart and reassemble in much the same manner. In the process, you can learn about eight major body systems and how they interact to make the whole body function.

The eight systems that you can explore through The Body in Focus are the integumentary (skin), digestive, skeletal, circulatory, muscular, nervous, respiratory and endocrine. They can be studied in any order and are chosen by pressing the corresponding labeled key on the accompanying keyboard overlay.

In addition to an individual key for each major system, the overlay also features keys labeled GO ON, REPEAT and TELL ME MORE. These let you study at your own pace, repeat sections if necessary and skip details when you just want an overview.

To help you understand some of the specialized functions of the body systems, many of the lessons include short animated demonstrations.

The section that works most like the doctor's plastic model is Body Close-Ups. Using the overlay key labeled REVEAL, you can peel away layers that expose muscles, organs, veins, arteries and bones below. Using the CONCEAL key, you can go back and forth among the layers to develop a sense of the physical positioning of the body's various components in relation to one another.

As the illustrations are displayed on-screen, a text window to the right provides the name of each body part, as well as descriptions of how each one functions.

Taken from a database of over 200 questions, another section of the program, Body I.Q., asks 20 randomly selected questions about the human body. By using the Body I.Q. before you've studied the eight body systems, and again after you've completed the lessons, you'll see that The Body in Focus can greatly increase your knowledge of anatomy.

The program's manual contains several illustrations that identify parts of the major systems in greater detail. It also includes a selected bibliography that lists 17 additional sources of information that can help bring your understanding of anatomy into even sharper focus. *(CBS Software, One Fawcett Place, Greenwich, CT 06836. C-64, C-128/$39.95 disk.)*

Bob Guerra
Charlestown, MA

MicroLeague Baseball/General Managers Disk

A

Pit Baseball's Hall of Fame Members Against Your High School's Best Team

There are many computer baseball simulations that let you pitch, many that let you bat, and even some that let you call the shots as a manager. But, as of this writing, there is only one computer baseball game that lets you run the show from the front office.

That's what makes MicroLeague Baseball with MicroLeague Sports' General Managers/Owners disk (available at additional cost) unique. You get to call the plays on the field *and* create or trade for the players who will make them. This capability enhances what was already one of the best computer baseball games on the market.

In the short time it's been around, MicroLeague has become the standard by which all other baseball strategy games are measured. It is a program designed by baseball lovers for baseball lovers—the kind of folk who have no trouble remembering how many home runs Ted Williams hit in 1956.

These enthusiasts don't necessarily care about joystick jockeying. They like computers because of the way they can juggle the statistics. MicroLeague Baseball is designed for them because even though baseball is best known as a game of inches, it is also a game of statistics.

MicroLeague Baseball enables fans to sort through those statistics and then use them while managing former and current major leaguers. It's a fantasy come true for real baseball aficionados, who can test their managing skills against the computer or a human opponent.

The basic game allows all the moves a big league manager has at his command. After picking the team you want to manage (25 actual teams are included, ranging from the powerful 1927 Yankees to the sad sack 1955 Washington Senators), you pick a starting pitcher and lineup. You then select offensive or defensive strategy with a single keystroke.

In the field, for example, you call the type of pitch, decide whether to play the infield in or at regular depth, and even decide when to visit the mound or check your roster for possible substitutions. When your team is at bat, you can choose to steal, pinch run, hit-and-run, sacrifice or use aggressive base running.

Once both managers make their calls, MLB goes to work, determining the outcome of every play. Factors such as a batter's success against left-handed pitching or a pitcher's wildness in late innings are taken into account by the program.

The graphics are first rate. The game screen shows a baseball dia-

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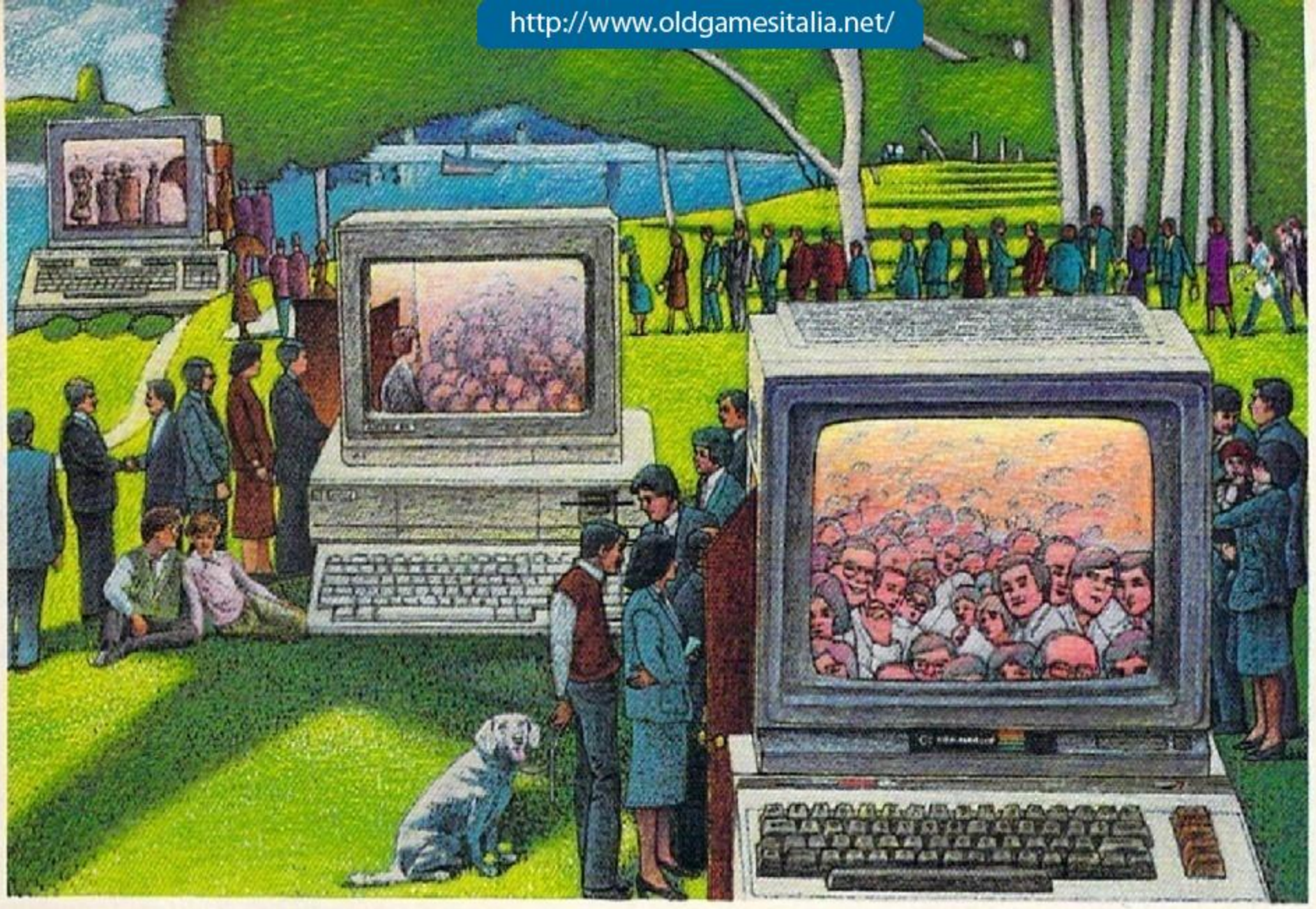

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mond from the perspective you'd get sitting in the second or third level behind home plate in a major league stadium.

At the top of the screen, a scoreboard displays the current inning, number of outs and each team's name, runs, hits and errors. Superimposed over the lower left and right sides of the diamond are the names of the player at bat, the one on deck and the pitcher.

Every play explodes into a flurry of on-screen activity. When a ball is hit, players dash to snare it, runners charge around the bases and the batter bolts for first. Animation is very smooth and realistic. And just to make sure there's no confusion about what's happening, the scoreboard provides a play-by-play narrative of the action.

It's hard to find fault with MLB. It gives baseball fans an opportunity to live out the dual fantasies of managing major league players and pitting players of different eras against each another. A Babe Ruth-Sandy Koufax confrontation can become a reality through MLB.

If that doesn't excite you, why not pitch to Ruth or bat against Koufax yourself? You can by using MLB's General Managers/Owners disk, which permits owners of MLB to trade players from one team to another or create entirely new teams and players.

Possibilities are limited only by your imagination. The GM/Owners disk enables you to make trades between teams from different eras. Imagine adding pitching superstars Koufax and Don Drysdale to the awesome offensive roster of the 1927 Yankees....

That team might beat every other one in the history of the game. But could it beat your old high school championship team? The GM/Owners disk permits you to create 25-man rosters made up of just about anybody you care to put on them. All you need do is follow simple on-screen, menu-driven directions and provide positions and statistics for each player. You can get that information from a baseball encyclopedia. Or make up superstar-caliber stats for your old high school teammates and let them take on the world.

MicroLeague Baseball with the GM/Owners disk makes all of that possible and does so flawlessly. The operation, instructions and graphics are all outstanding, and the programming is so good that MLB game results are very realistic. So much so that the program is endorsed by Major League Baseball and Detroit Tigers manager Sparky Anderson.

But don't take their word for it. MicroLeague Baseball is the answer to the dreams of baseball fans everywhere. If you've always wanted to manage big leaguers or create a dynasty of your own, MicroLeague Baseball is your ticket to paradise. *(MicroLeague Sports Association, 2201 Drummond Plaza, Newark, DE 19711. C-64/$39.95 each disk.)*

Scott Wasser
Wilkes-Barre, PA

Quizam!

B

Cygnus Takes the Triviality out of Trivia Games

If you still enjoy playing trivia games, Quizam! is worth a good look. Cygnus, the company that brings you Quizam!, has added sparkle to a game genre that had seemingly lost its lustre.

The key to Quizam!'s success is explained on the cover of this disk-based program. It says, "Finally...a computer trivia game where the computer isn't trivial." Quizam! not only makes use of the computer, it depends on it. The program requires your C-64 to select and display questions, evaluate your answers, keep a running score for each player, display a game board and provide musical accompaniment to game play.

Particularly impressive are Quizam!'s many options. You and up to seven of your friends can play on any of eight different game boards at any of eight levels of difficulty. The game can be played in a long or short version, using a joystick, paddle or keyboard.

Over 2,000 questions in two categories are provided with Quizam! One disk contains two sets of "Fun Facts" questions (one set on each side of a disk). The main game program disk contains "School Days" questions on its flip side.

The Fun Facts subjects are: 15-minute celebrities, sports and games, popular culture, television, potpourri, publications, music and movies. The School Days topics are: vocabulary, history, art, physical science, geography, literature, music and life science. Cygnus claims that other question disks are already available and more are coming.

Each of the eight subjects on a question disk tests your knowledge with 85 questions. Questions are not repeated until each one has been asked. That means you can play a few games, turn off the computer and not have to go through the same questions the next time you play.

If that's not enough variety, Quizam! includes a "Quizzer" feature that enables you to create your own question disks. The potential here seems limitless. For example, members of a Commodore user's group could create a disk filled with questions related to the C-64. Or you could create one with questions about relatives and play it at family gatherings.

Using Quizzer to create your own question disks is easy. So too, for that matter, is it easy to play Quizam! The program design and instruction manual are straightforward. Once you get past the menu-driven option screen, game play proceeds smoothly.

That's because your C-64 is running the show. First it displays the multi-color game board on your monitor. Using a joystick, you begin play by pressing the fire-button. The monitor then displays the question screen, at the bottom of which is a bar divided into eight colored segments. This screen also displays the title of the question topic and the name and score of the current player.

Within seconds, you're prompted to press the fire-button again. That begins a sequence in which a question and four multiple-choice answers are displayed in ticker-tape fashion. As soon as the last choice is presented, the bar at the bottom of the screen begins to shrink as the computer begins a countdown.

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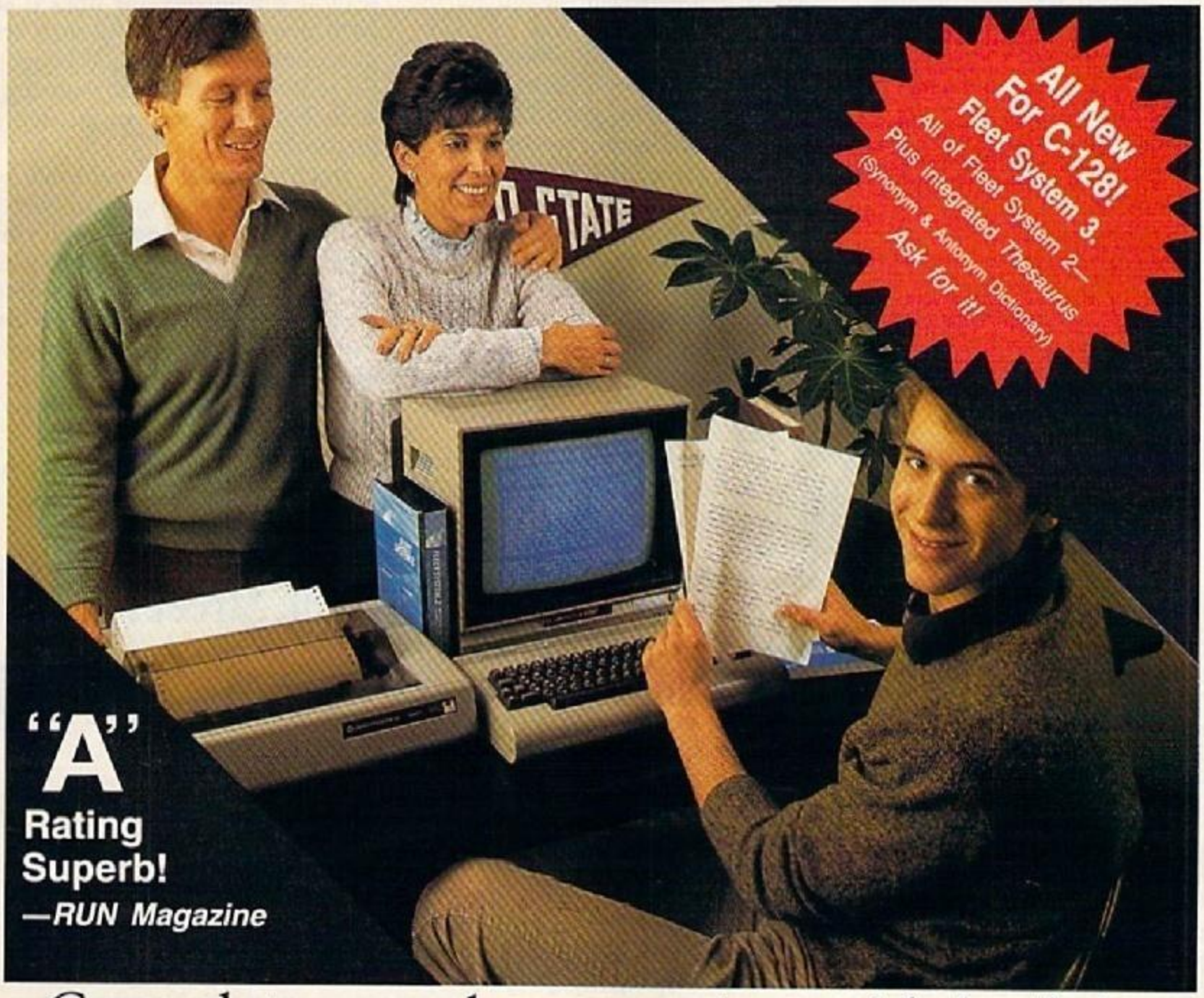

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You choose your answer by pushing the joystick in the appropriate direction while holding down the fire-button. The difficulty levels determine the number of guesses you may make in a given turn.

The quicker you provide the correct answer, the more spaces you can move on the game board. The object is to land on a space occupied by a satellite, then correctly answer a question and collect that satellite.

Strategy is an important part of Quizam! because a player must move the exact number of spaces determined by the time remaining when a question was answered. If you're sure you know the correct answer, wait until the computer counts down to the number of spaces you need in order to land on a satellite before guessing. In most cases, that means you'll be giving up the opportunity to guess again if you're wrong.

By requiring players to use strategy and a computer, Cygnus has added freshness to a game idea that had been turning stale. My only complaint is that at least one question provided with the game is impossible to answer correctly. There may be others, but I didn't come across them in several hours of play.

The incorrect question-and-answer notwithstanding, Quizam! is an excellent program for those Commodore owners who enjoy trivia games. *(Cygnus, PO Box 57825, Webster, TX 77598. C-64/$39.95 two-disk set.)*

Scott Wasser
Wilkes-Barre, PA

Shadowfire

C

Rescue a Kidnapped Emissary Carrying Plans For a Top-secret Starship

There are elements of a text adventure in Shadowfire, although you control the action with a joystick and icons; there are elements of a role-playing fantasy, although you cannot alter traits but only work with them; there are even elements of a maze game. With all these working for it, you'd expect Shadowfire to be one heck of a game—yet it comes close to being overburdened by its own complexity.

In the far future, an emissary carrying plans for the top-secret starship Shadowfire is kidnapped by the villain, Zoff. Zoff has not yet found the plans (they are embedded in the emissary's spine), but time is running out, and he who possesses the Shadowfire will control the universe.

Your mission as commander of the Enigma team is to beam aboard Zoff's spaceship and, within one hundred minutes of real time, rescue the emissary, capture Zoff and destroy the spaceship.

From a menu of icons, you select up to six Enigma team members. Once a team member is selected, the next screen shows that character's agility, stamina and strength as well as the weight he can carry.

The Objects screen allows you to arm your character, and it is here that things begin to get tedious. You click on the Pickup icon, then go to the object and click on it. Should you wish to have that object ready for use, you must first click on the Ready icon, then click on the object. All this takes place in the bottom half of the screen.

The top half of the screen shows a scrolling-message bar, a set of icons representing the characters, the section of Zoff's spaceship your character currently occupies and a close-up of the character with whom you are currently working.

With all this taking up half the screen, resolution suffers, and the small size some of the icons are forced to assume sometimes makes it difficult to know who is doing what.

The bottom half of the screen lets you select options for the character. You can control your character's movement, select his armaments and send him into battle. Other options allow you to choose whether to attack, hold or retreat.

If you feel inadequate to the task, you can probably go back to the Objects menu, pick up the Transporter, beam down to pick up a weapon, drop the Transporter, activate the Transporter, beam up and. . . you get the idea.

There are two major flaws in Shadowfire: In a game where you must race against a clock, it does not seem fair that each move should consist of several sub-moves; nor does it seem right that a scenario with such action potential should become bogged in the tedium of continually moving two steps back in order to go one step forward.

Documentation is good, but keep it close by for complex moves. The sound is minimal and graphics are as good as you can expect from such a crowded screen. While it may deserve an E for effort, Shadowfire ends up with a grade average of C—they forgot to make it fun. *(Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062. C-64/$29.95 disk.)*

Ervin Bobo
St. Peters, MO

Bank Street Mailer

B

Zip Through Those Seemingly Endless Letters and Cards

Do you write many business or form letters, or have you a Christmas- or birthday-card list as long as your arm? If so, you could probably make good use of Broderbund Software's Bank Street Mailer program, which is designed to make letter writing, addressing and mailing as efficient and effortless as possible.

The first of Bank Street Mailer's two separate yet integrated programs is a letter-writing program. With its on-screen menus and prompts, you can easily correct mistakes, number pages, move blocks of copy, highlight words or phrases and place text where you want it. There's even a help screen that can be accessed at any time. The word processing functions in the Letter-writing mode are patterned after those in the popular Bank Street Writer program. So if you've used that package, you already know how to use this one.

Since Bank Street Mailer is designed primarily for letter writing, it adds some functions to help you do that. You can automatically add dates, addresses, salutations and closings to any letter. It also enables you to "personalize" form letters by automati-

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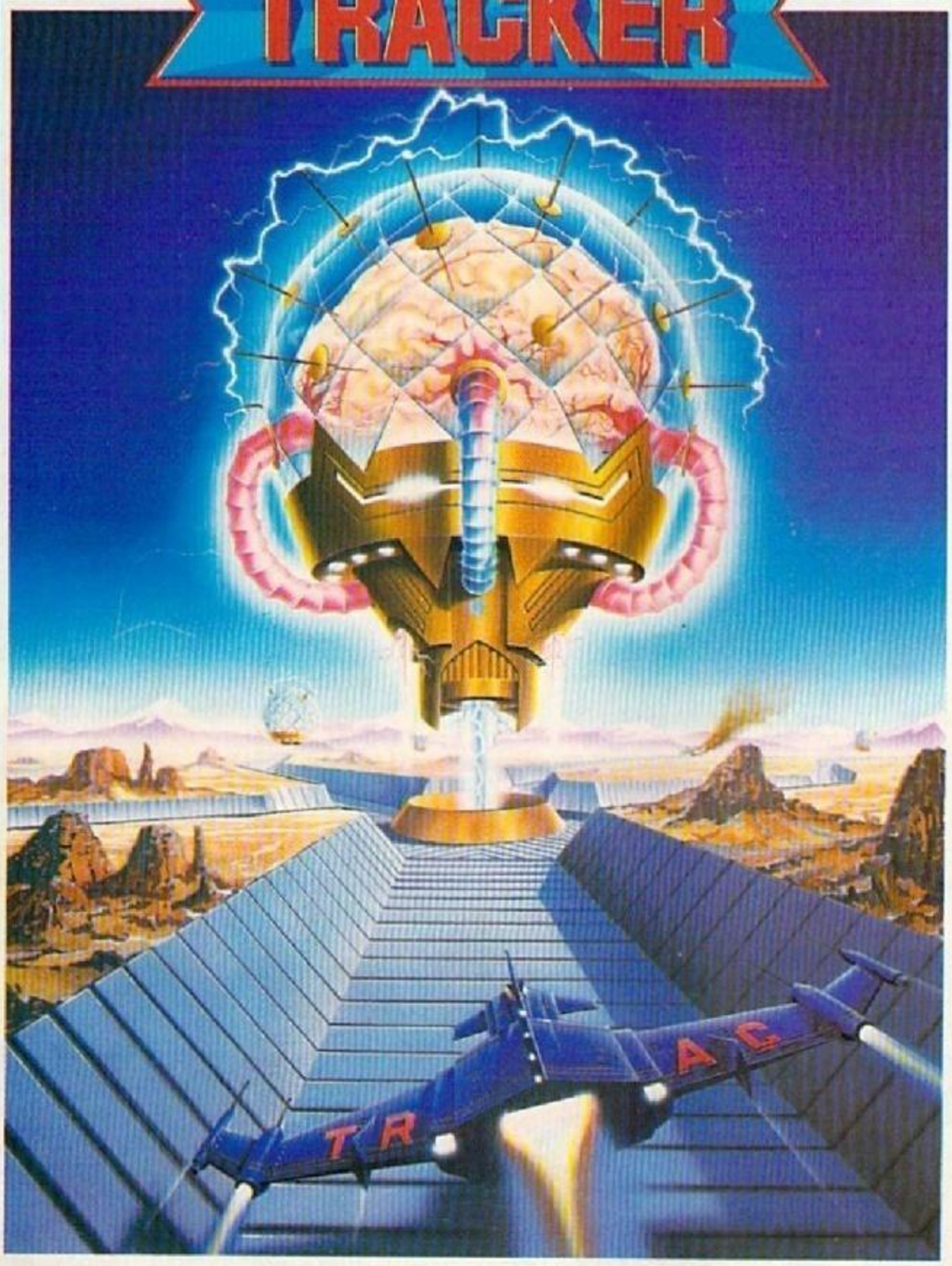

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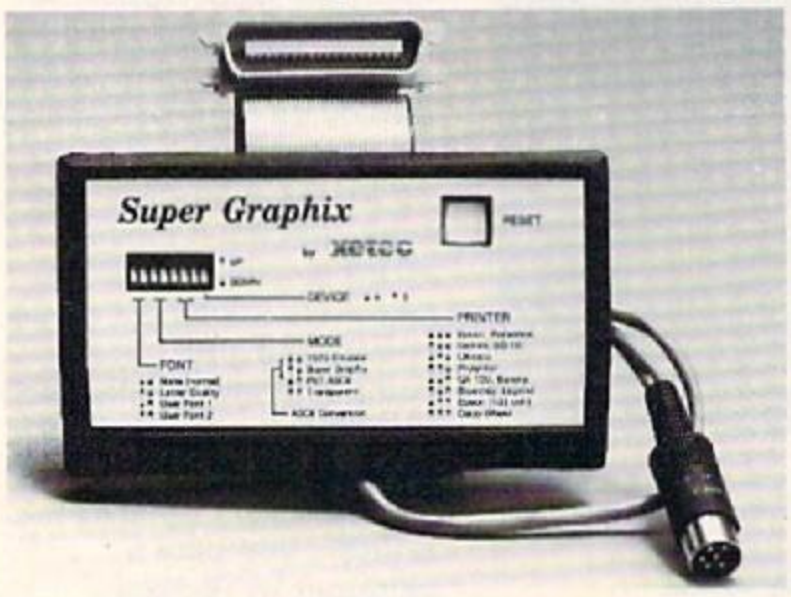

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cally changing just the address and salutation on any letter as it is being printed.

This is where the other program on Bank Street Mailer comes into play. It's a mini-database that enables you to store the names, addresses and other important information about businesses or people to whom you might write. That information can then be merged into the letter-writing program.

The mailing-list program is also menu driven, and both menus and prompts are on the screen at all times. There are nine preset fields in the mailing program that handle just about all mailing-list information you'd need to put on an envelope or letter. You can also add up to six additional fields to keep track of items such as birthdays and anniversaries.

Since this program functions like a database, you could set up a mailing list of everyone to whom you send birthday cards, making "Birthday" one of your optional fields. Then, once a month, you could boot up the program and your data disk and request that mailing labels or envelopes be addressed for those people whose birthdays are in that month. The program will automatically find, sort and print only those names and addresses that meet your criteria.

The documentation comes in three forms. The first is an 83-page instruction manual that is both complete and easy to follow. But you may never need to use it, because Bank Street Mailer includes a set of "quick start" instructions on an index card. And, if that's not enough, there's also a disk-based tutorial that guides you through all of the program's functions and let's you try many of them.

Bank Street Mailer is compatible with the other Bank Street programs, Writer, Speller and Filer, and that means you can, for example, use the speller to check letters you've written with Bank Street Mailer.

You'll probably find yourself writing a lot more of those letters if you get Bank Street Mailer, because this is one productivity program that really produces. *(Broderbund Software, 17 Paul Drive, San Rafael, CA 94903. C-64/$49.95 disk.)*

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Computerize Your Finances

Be "cents-ible" about home money management by taking advantage of the many available commercial and public domain programs that help you keep track of your finances.

By JOSEPH J. SHAUGHNESSY

I'm sure you remember the fable of the grasshopper and the ant. The ant worked hard all summer long, storing up food for the winter, while the grasshopper laughed and sang and danced in the sunlight. When the cold winds of winter came, the grasshopper would have perished if the kind-hearted ant hadn't taken him in.

The moral is obvious, and it applies to personal finances as well as to household larders. In fact, it's really amazing that so many of us are financial grasshoppers. We save bills, receipts, check stubs and other records in old shoeboxes, manila folders or just piled in odd corners. We budget by paying our bills one at a time, more or less at random, until we run out of money. Because of our haphazard methods, every once in a while the financial winter catches up with us.

Let's assume you'd like to turn over a new leaf and get your finances organized to avoid those lean times. How can your computer help? First of all, it can store your financial records. Then, on the basis of those records, it can paint a picture of your financial history, show you where you stand now, and even extrapolate into the future. It can outline such things as spending patterns, possibilities for saving and relationships between income and outgo.

Have you ever asked yourself, "Where did all that money go?" Personal-finance software can help you answer that question, and others you didn't even know enough to ask.

Personal-finance software includes programs to handle your checkbook, budget development, financial analysis, investment planning and income-tax preparation. You can get the software from commercial sources, or, at little or no cost, from magazines like *RUN* and from public-domain sources such as user's group libraries, on-line networks and local bulletin boards.

Public-domain programs generally perform a limited number of functions, and they usually come without instructions or other support, which may be a problem when you're dealing with calculations you don't fully understand. However, documentation text files are included on some public-domain disks. Most full-featured commercial programs come with an instruction manual, and usually the companies behind them will respond to your questions.

A list of commercial personal-finance software that is currently available for the C-64 and C-128 appears in Table 1. Table 2 lists sources of public domain or low-cost software.

Checkbook Programs

There are a lot of checkbook programs around. I hate to say it, but disillusionment with these programs often keeps people from going on to try the more complete financial programs available. One problem with checkbook programs is that, after typing in all of your checking transactions, you end up with a report that is basically the same as the monthly statement your bank sends you for free.

Another problem is the time it takes to use a checkbook program. I reconcile my checkbook against the statement from the bank every month—a simple process that has never taken me longer than ten minutes to do by hand. I did it by computer a few times, and it never took less than 25 minutes.

On the plus side, some checkbook programs allow you to arrange your check records by category, such as tax-deductible, utilities, mortgage or rent, and so forth. Then you can print these categories out as needed.

Another useful feature of checkbook programs is that they almost eliminate arithmetic errors in your checkbook record. Of course, this is no advantage if you make errors when typing in the data. These programs are often included in the fancier budget packages as a convenient way of inputting data.

Budget Programs

Home-budget programs usually consist of three parts. The first is for planning—predicting your income and expenses. This requires some

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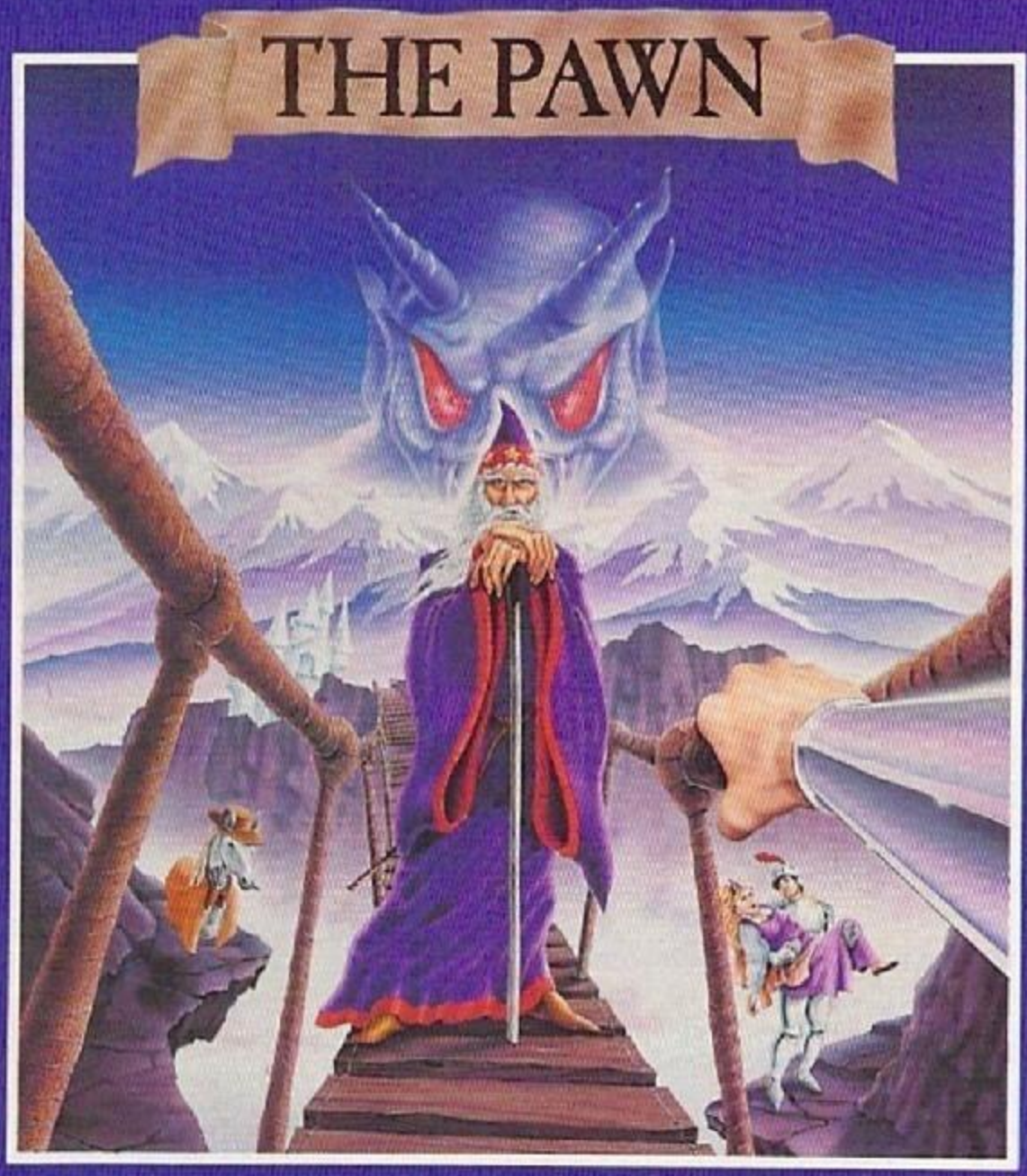

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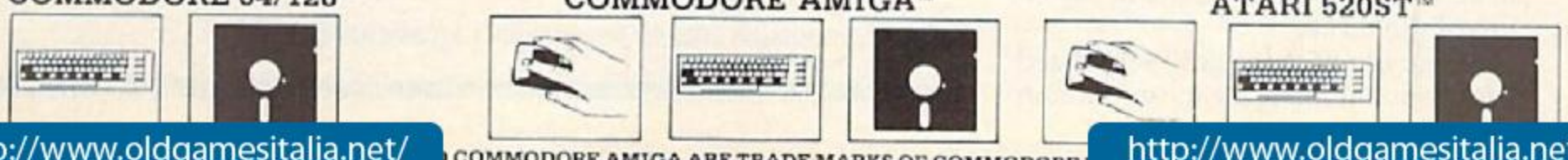

COMMODORE AMIGA ARE TRADE MARKS OF COMMODORE
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work on your part, but most programs help by providing standard expense categories that you can add to or delete as your lifestyle dictates.

The second part of the program is for recording actual income and expenses as they occur. It's important to input your data regularly here, because if you lag behind, you may get discouraged and give up the whole project.

The third part of a budget program is for reviewing your financial situation and printing out reports. As you use this section, your spending patterns and areas where you can save money will become apparent. You'll be better able to anticipate seasonal bills and to fine-tune your budget as you see where expenses and income vary from your estimates. Most of these programs let you print out reports in tabular or graphic (usually bar-chart) form.

Financial-analysis packages can range from those limited to the performance of a specific calculation to multi-functional programs arranged in a modular format.

A budget program is an excellent home use for your computer. After the initial time investment for entering data, regular updates won't take long, and the results will probably be a revelation.

Financial-Analysis Programs

Financial-analysis packages can range from those limited to the performance of a specific calculation to multi-functional programs arranged in a modular format, where each module is a small program in itself. All these packages analyze the time value of money, using the interest rate, principal amount, time period, compounding rate and installment amount as variables. They usually assume you have enough background in accounting to understand the meaning of the terms.

Home use of these business-related programs is limited, the most common

Cash Command; Practical Programs, Inc.; PO Box 93104, Milwaukee, WI 53203; 414-278-0829; $59.95. Designed for individuals and small businesses, this program prints checks, maintains a checkbook and creates balance sheets and income statements.

Compbank-64; Sunrise Software; Sunrise, FL 33322; 305-748-0775; $19.95. Print checks, store data, track outstanding checks and reconcile accounts with this package.

The Electric Ledger; Datamatic Software; 4610 Music St., New Orleans, LA 70122; 504-282-0018; $49.95. Designed for personal and small-business use, this program lets you balance your checking account, record tax deductions, keep track of account deposits and generate monthly totals and year-to-date summaries.

The Electronic Checkbook; Timeworks, Inc.; 444 Lake Cook Road, Deerfield, IL 60015; 312-948-9200; $24.95. Organize and record checkbook transactions and have your balance automatically figured with this system.

The Financial Calculator; H & E Computronics, Inc.; 50 N. Pascack Road, Spring Valley, NY 10977; 914-425-1535; $99.95. This program calculates present value, interest, future value, payments and number of periods.

Financial Cookbook; Electronic Arts; 1820 Gateway Drive, San Mateo, CA 94404; 415-571-7171; $40. This product helps you manage your money.

Financial Partner; Practical Programs, Inc.; PO Box 93104, Milwaukee, WI 53203; 414-278-0829; $74.95. A bookkeeping program for personal and small-business use; helps balance your checking account, maintain records and organize finances.

Home Budget Manager; H & E Computronics, Inc.; 50 N. Pascack Road, Spring Valley, NY 10977; 914-425-1535; $49.95. This manager helps keep track of income and expenses.

Home Finance Manager; Cardinal Software; 13636 Jefferson Davis Highway, Woodbridge, VA 22191; 703-491-6494; $49.95. Maintain home records, store over 200 transactions per month, calculate and print out reports with this manager.

Home Organizer Series; Batteries Included; 30 Mural St., Richmond Hill, Ontario, Canada L4B 1B5; 416-881-9941; $29.95 ea. This series includes helpful packages such as Checkbook and Home Inventory.

Hot Accounts; Computer Ed. Software; 3051 India St., San Diego, CA 92103; 619-295-4145; $64.95. A word processor and a graphics package are also included in this bookkeeping system that tracks charge cards and checkbooks.

Income Tax Assistant; H & E Computronics, Inc.; 50 N. Pascack Road, Spring Valley, NY 10977; 914-425-1535; $49.95. Help yourself prepare income tax returns with this assistant.

Lifeplan; Lifeware; 2318 Second Ave., Seattle, WA 98121; 206-322-5454; $99.95. Particularly for middle-income families, this program helps manage finances, analyzes results and monitors progress.

J.K. Lasser's Your Money Manager; Simon & Schuster Software; One Gulf + Western Plaza, New York, NY 10023; 212-333-5800; $69.95. This program contains on-screen menus with built-in help features; also 28 forms and schedules organized to match the official IRS forms.

The Money Manager; Timeworks, Inc.; 444 Lake Cook Road, Deerfield, IL 60015; 312-948-9200; $24.95. Enter 16 budget categories on a monthly basis for one year and obtain analyses, comparisons and bar charts.

Mortgage Calculator; H & E Computronics, Inc.; 50 N. Pascack Road, Spring Valley, NY 10977; 914-425-1535; $29.95. This program instantly calculates your mortgage payments.

Mortgage Maker; Navic Software; PO Box 14727, North Palm Beach, FL 33408; 305-627-4132; $29. This software prints your own amortization tables.

Personal Accountant; Softsync, Inc.; 162 Madison Ave., New York, NY 10016; 212-685-2080; $34.95. This home finance manager generates trial balances and expense reports to keep your finances in order.

Personal Inventory, Personal Accountant and **Personal Time Manager**; Cardco, Inc.; 300 S. Topeka, Wichita, KS 67202; 316-267-3807; $39.95. Contains a budgeting tool, a record of net worth and an appointment scheduler.

Table 1. *Commercially available personal-finance software packages.*

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Personal Portfolio Manager; Abacus Software; 2201 Kalamazoo SE, PO Box 7211, Grand Rapids, MI 49510; 616-241-5510; $39.95. If you need to organize your portfolio, PPM helps you do it.

Portfolio Manager—Options Analysis; Basic Byte, Inc.; PO Box 924, Southfield, MI 48037; 313-540-0655; $79.95. Gives you stock-option record-keeping and fair market value analysis.

Portfolio Manager—Stock Management, Vol. 1; Basic Byte, Inc.; PO Box 924, Southfield, MI 48037; 313-540-0655; $79.95. Invest in the stock market and obtain gain/loss reports, dividend and portfolio value updates with this package.

64-Accounting; Software Design, Inc.; 1945 Mitchell Ave., PO Box 570, Waterloo, IA 50704; 800-553-0002; $69.95. This system is designed for personal or small business accounting: financial statements, trial balances, check writing and reconciliation and statement printing.

Stock Broker; Acorn of Indiana; 2721 Ohio St., Michigan City, IN 46360; 219-879-2284; $39.95. Your Broker can print out bar graphs and record up to 144 stocks on a disk.

StockTrender; J.B. Horton Company; PO Box 2426, Bethlehem, PA 18017; 215-932-9191; $75. This package will store up to 100 stocks or mutuals, make calculations and show annual yields.

Superbase 128; Progressive Peripherals & Software; 464 Kalamath St., Denver, CO 80204; 303-825-4144; $99.95. Here is a database program, standard for the C-64, now available for the C-128.

Swiftcalc 64/128; Timeworks, Inc.; 444 Lake Cook Road, Deerfield, IL 60015; 312-948-9200; $49.95. This is an easy-to-use spreadsheet for home use or a small business.

Swiftax; Timeworks, Inc.; 444 Lake Cook Road, Deerfield, IL 60015; 312-948-9200; $49.95. Guides you through the tax preparation process; checks alternatives, prints directly onto tax forms and prints amortization schedules.

Sylvia Porter's Personal Finance Series: Your Personal Finance Planner; Timeworks, Inc.; 444 Lake Cook Road, Deerfield, IL 60015; 312-948-9200; $49.95. This program helps you determine the best financial moves for you and your family.

Sylvia Porter's Personal Finance Series: Your Personal Investment Manager; Timeworks, Inc.; 444 Lake Cook Road, Deerfield, IL 60015; 312-948-9200; $69.95. This program helps manage your investment transactions, track portfolios, monitor retirement investments and gains and losses.

Tax Command—Planner; Practical Programs, Inc.; PO Box 93104, Milwaukee, WI 53203; 414-278-0829; $49.95. This planner is capable of comparing up to six different tax strategies for periods of up to five years.

Tax Command—Professional; Practical Programs, Inc.; PO Box 93104, Milwaukee, WI 53203; 414-278-0829; $49.95. This is a menu-driven computation program for tax forms and schedules.

TaxWare; Skyles Electric Works; 231E S. Whisman Road, Mountain View, CA 94041; 415-965-1735; $49.95. Stay up-to-date with this year-round record-keeping and tax-preparation system: handles itemized deductions, income averaging, dividends, stocks and more.

Vizastar 64/128; Solid State Software; 1125 E. Hillsdale Blvd., Suite 104, Foster City, CA 94404; 415-341-5606; $119.97. Use this integrated spreadsheet, database and graphics program on your C-64 or C-128.

The Works!; Grolier Electronic Publishing; 95 Madison Ave., New York, NY 10016; 212-696-9750; $49.95. This C-64 program contains individual finance modules like Stock Portfolio and Finance Record Keeper, among other productivity applications.

Your Personal Accountant; TriMicro; 14072 Stratton Way, Santa Ana, CA 92705; 714-832-6707; $19.95. This program's menus help you define budget and expense categories and bank accounts.

Your Personal Net Worth; Scarborough Systems, Inc.; 55 S. Broadway, Tarrytown, NY 10591; 914-332-4545; $49.95. This program helps you organize and improve your finances, including budgets and investments.

application being to figure payments for a mortgage or other installment loan. However, if you have the knowledge, you may want to use them for figuring annuities, retirement benefits or investment strategies.

Financial-analysis programs do not require much data input for meaningful results. I have to type in only about five values to produce a printout of a mortgage-repayment schedule. Most of these programs will print out your input data along with the report.

Investment Programs

If you have money in stocks, bonds, mutual funds or an IRA account, an investment program will help you manage your portfolio. It will keep track of what you bought, when you bought it and how much you paid, and when you sold it and how much you received. It will calculate your profits and losses, broker commissions and tax liabilities and generally give you a picture of where your investments stand at any time. Some of these programs chart cyclical stocks and predict their future swings, or develop investment strategies based on risk factors, your tax bracket and other information.

My income tax program is my favorite. It does all the calculations and prompts me for data it needs for filling out the forms.

Probably the best home application for investment programs is record-keeping, especially if you make a lot of transactions during the year. It's also fun to play "what-if" with an investment program, imaginary money and real market data. You can learn a few things about market behavior this way.

Income-Tax Programs

My income-tax program is my favorite. It does all the calculations and prompts me for data it needs for filling out the forms. It also prints my

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For C-64 and C-128 in all modes:

Toronto Pet Users Group (TPUG)
Bruce Hamsen, General Manager
101 Duncan Mill Road
Suite G7
Don Mills, Ontario
Canada M3B 1Z3
416-445-4524

For a lengthy list of local Commodore user's groups see *RUN*'s 1986 Special Issue.*

For C-128 in CP/M mode:

SIG/M (Special Interest Group for Microcomputers)
PO Box 97
Iselin, NJ 08830

FOG (First Osborne Group)
PO Box 3474
Daly City, CA 94015
415-755-4140

Ralph S. Lees, Jr.
Poseidon Electronics
103 Waverly Place
New York, NY 10011
212-777-9515

For more detailed information on sources of public domain CP/M software, see the January 1986 issue of *RUN*.* A list of FOG bulletin-board phone numbers and instructions on using Remote CP/M (RCP/M) bulletin boards is included.

On-line networks:

QuantumLink
Quantum Computer Services
8620 Westwood Center Drive
Vienna, VA 22180
800-392-8200
Within Virginia: 703-448-8700

Delphi
General Videotex Corp.
3 Blackstone St.
Cambridge, MA 02139
800-544-4005
Within Massachusetts: 617-491-3393

CompuServe
5000 Arlington Centre Blvd.
Columbus, OH 43220
800-848-8199
Within Ohio: 614-457-8650

For a longer list of on-line services, see *RUN*'s 1986 Special Issue.*

RUN articles:

"Money Manager," by Robert W. Baker, in the March 1985 issue.* This program does investment and loan calculations.

"Finance Aid," a program on the 1985 ReRUN Productivity Pack disk. Refer to the ReRun ad in this issue for ordering instructions. The page number of the ad appears in the List of Advertisers, on the last page of the issue, under RUN.

"Graph Maker 64," by Doug Smoak, in the April 1985 issue.* This program creates, saves and prints bar graphs.

* Back issues of *RUN* are available for $3.50, plus $1.00 postage and handling, from *RUN*, Back Issue Orders, 80 Pine St., Peterborough, NH 03458.

Table 2. *Sources of public domain personal-finance software.*

necessary 1040 forms and schedules and the back-up documentation for my own files. The only thing it doesn't do is round up the shoeboxes.

As I use the program, I see how every one of my financial transactions affects my tax liability. What's the tax difference if I start an IRA? The answer is only few keystrokes away.

If you submit the long 1040 form as I do, there's no better way to do your taxes. And even if you have an accountant do the job for you, you may want to consider a tax-preparation program to organize the supporting data.

A Note About Spreadsheets

Almost any of the chores that personal-finance programs perform can be duplicated by spreadsheet templates. These are blank financial formats of various kinds that you can hang your own numbers on. You type a template into your spreadsheet program and then save it to disk. To use it, you load it back into the spreadsheet and fill in the blanks with your numbers. Then the program calculates the answers, using the template formulas and your numbers.

I've seen template forms for checkbooks, budget planning, financial analysis, investments and income-tax preparation, and there are books available containing many standard templates.

One of their drawbacks is that you need some financial background to use them. On the other hand, the full-featured personal-finance programs lead you by the hand, so you don't need as much experience.

A final caution: Because of the prodigious data input required with personal-finance programs, make sure the program you choose will satisfy all your requirements, both now and in the foreseeable future. You won't want to type in all the data again later. Talk to other users, read reviews in magazines, check the technical specifications in the literature accompanying the package and try to get a hands-on demonstration from your dealer or another user.

I know all you grasshoppers haven't become ants by reading this article. However, you should consider getting a personal-finance program. Some day, when you feel like engaging in a little ant-like activity, you can type in the preliminary data, then keep the program handy for updates. Once it's up and running, you won't want to give it up—and it may even be fun! R

Address all author correspondence to Joseph J. Shaughnessy, c/o Reynolds, Smith & Hills, PO Box 4850, Jacksonville, FL 32201.

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THE LOAN ARRANGER

What's that loan really going to cost you in the long run? This program will provide the answer.

By JAAP KROES

How would you like an amortization schedule of each outstanding loan you have, including the mortgage? By having such a schedule, you can easily calculate for tax-deduction purposes the amount of interest you paid during the preceding year.

The Loan Calculator and Amortization program (Listing 1) for the C-64 and C-128 will do all that for you. It's easy to use, requiring only input to the questions asked on the screen. And if you want a hard copy of the amortization schedule, just answer *Y* when prompted for it, and you'll get a neat, easy-to-read printout.

Using the Program

Type in Listing 1 and save it to disk or tape before running it. After you run it, a menu will appear.

Option 1, Monthly Payments, consists of three questions to determine your monthly payments. You'll be prompted to enter your loan principal, the interest rate and the number of months in the repayment schedule. This is a handy feature, since you may wish to see what effect different interest rates would have on your monthly payment.

Option 2, Loan Balance, begins by prompting you to enter the amount of your current loan. It then asks you for the amount of your monthly payments and how many you've made, and finally for the interest rate. The remaining balance is instantly displayed, and you are asked if you want to run another. An *N* answer returns you to the main menu.

The most interesting part of the program is option 3, Amortization, which will list the figures to your screen or printer.

Again you are asked to input the amount of the loan, the interest rate and the duration of the loan in months. You are then asked if you want a hard copy. If you answer *N*, the amortization schedule of your loan is printed to the screen. The top three lines of the screen consist of the column headings. The figures scroll through the rest of the normal screen.

After the program loops through the formulas—one loop per month—you are informed of the total amount of your payments and the cost of the loan. The cost of the loan is nothing more than the total of payments minus the principal amount of the loan.

Please note that on occasion, when working with large loans, the amounts may be off by a few cents. This is due to the method of rounding, which doesn't always go to the nearest penny. However, the program has been exceptionally accurate in most situations.

If you answer *Y* when asked if you want a hard copy, you'll get a printout of the amortization schedule. The routine should work fine with your Commodore printer as well as with third-party printers. Tabbing is accomplished in a rather crude but effective way, using

```
PRINT#4,""TAB(n)X$
```

where *n* is the number of spaces to tab.

Page advance is automatic by means of counter K. When this counter reaches 42 lines, the program prints a message at the bottom of the page and increases the page number by 1. A form-feed is sent to the printer, and the counter K is reset to 0. The next page number appears at the top of the next page and is followed by the column headings.

When you wish to exit the program, select option 4. A final message is printed to the screen, and the program ends.

All in all, you should find the program to be a very accurate and useful addition to your financial program library. And it should help you make some informed decisions about borrowing money prior to your actual shopping. The amortization schedule makes tax time a little easier, since you don't have to rely on lenders to provide you with interest-paid information. R

Address all author correspondence to Jaap Kroes, PO Box 66, Pella, IA 50219.

RUN It Right

C-64; C-128 (in 40-column mode)
Printer optional

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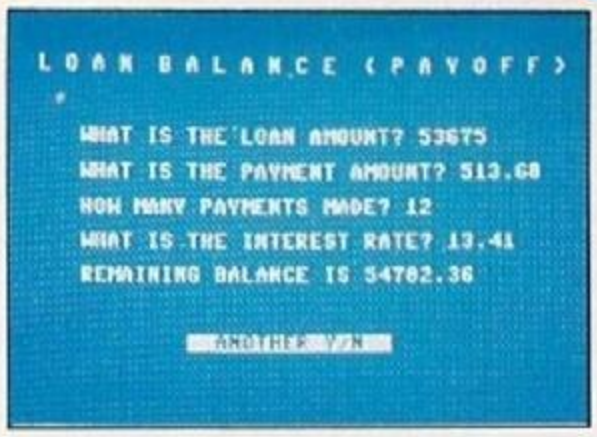
LOAN BALANCE (PAYOFF)
WHAT IS THE LOAN AMOUNT? 53675
WHAT IS THE PAYMENT AMOUNT? 513.68
HOW MANY PAYMENTS MADE? 12
WHAT IS THE INTEREST RATE? 13.41
REMAINING BALANCE IS 54702.36

Listing 1. *Loan Calculator program.*

```
1Ø REM 64/128 LOAN AMORTIZATION
   PROGRAM                    :REM*154
2Ø REM BY JAAP KROES          :REM*156
3Ø REM Ø3/86                  :REM*34
4Ø PRINT"{SHFT CLR}":POKE5328Ø,Ø
   :POKE53281,Ø:POKE646,7:REM*28
5Ø A$="64/128 LOAN AMORTIZATION
   PROGRAM"                   :REM*2Ø8
6Ø GOSUB9Ø:A$="BY{2 SPACEs}JAAP{
   2 SPACEs}KROES"            :REM*92
7Ø GOSUB9Ø:A$=" BOX 66,{2 SPACEs
   }PELLA, IA. 5Ø219"         :REM*188
8Ø GOSUB9Ø:FORT=1TO1ØØØ:NEXTT:GO
   TO14Ø                      :REM*142
9Ø A%=LEN(A$):Y=A%            :REM*158
1ØØ PRINT"{2 CRSR DNs)":FORX=1TO
    A%                        :REM*248
11Ø PRINTTAB((39-A%)/2)MID$(A$,Y
    ,X)"{CRSR LF}{CRSR UP}"
                              :REM*36
12Ø Y=Y-1:FORD=1TO25:NEXTD:NEXTX
    :RETURN                   :REM*188
14Ø PRINT"{SHFT CLR}"         :REM*13Ø
15Ø PRINTSPC(12)"{2 CRSR DNs}L O
     A N{2 SPACEs}M E N U"
                              :REM*76
16Ø PRINTSPC(11)"{2 CRSR DNs}1)
   MONTHLY PAYMENT"           :REM*122
17Ø PRINTSPC(11)"{CRSR DN}2) LOA
   N BALANCE (PAYOFF)"        :REM*218
18Ø PRINTSPC(11)"{CRSR DN}3) AMO
   RTIZE A LOAN":PRINTSPC(11)"{
   CRSR DN}4) END PROGRAM"
                              :REM*186
19Ø GETA$:IFA$=""THEN19Ø:REM*132
2ØØ IFA$<"1"ORA$>"4"THEN19Ø
                              :REM*116
21Ø ONVAL(A$)GOTO22Ø,35Ø,5ØØ,84Ø
                              :REM*28
22Ø PRINT"{SHFT CLR}{2 CRSR DNs}
   {5 SPACEs}M O N T H L Y{2 SP
   ACEs}P A Y M E N T":PRINT
                              :REM*8
23Ø INPUT"{2 CRSR DNs}{6 SPACEs}
   1) LOAN PRINCIPLE ";LP
                              :REM*96
24Ø INPUT"{CRSR DN}{6 SPACEs}2)
   LOAN INTEREST{2 SPACEs}";LI
                              :REM*96
25Ø IR=LI/12                  :REM*38
26Ø INPUT"{CRSR DN}{6 SPACEs}3)
   LOAN DURATION (MONTHS)";LD:P
   RINT                       :REM*183
27Ø X=(1-(1+IR/1ØØ){UP ARROW}-LD
   )/(IR/1ØØ)                 :REM*21
28Ø MP=LP/X:MR=INT(MP/Ø.Ø1)*Ø.Ø1
                              :REM*21
29Ø MR$=STR$(MR+.ØØ1):MR$=MID$(M
   R$,2,(LEN(MR$)-2))         :REM*137
3ØØ PRINT"{CRSR DN}{6 SPACEs}4)
   MONTHLY PAYMENT = $";MR
                              :REM*185
31Ø PRINT"{2 CRSR DNs}{11 SPACEs
   }{CTRL 9}{3 SPACEs}ANOTHER{3
    SPACEs}Y/N{3 SPACEs}{CTRL Ø
   }"                         :REM*151
32Ø GETA$:IFA$<>"Y"ANDA$<>"N"THE
   N32Ø                       :REM*73
33Ø IFA$="N"THENRUN14Ø        :REM*59
34Ø IFA$="Y"THENRUN22Ø        :REM*177
35Ø PRINT"{SHFT CLR}{2 CRSR DNs}
    L O A N{2 SPACEs}B A L A N
   C E{2 SPACEs}( P A Y O F{SHF
   T SPACE}F{SHFT SPACE})":PRIN
   T                          :REM*165
36Ø INPUT"{CRSR DN}{4 SPACEs}WHA
   T IS THE LOAN AMOUNT";PV
                              :REM*249
37Ø INPUT"{CRSR DN}{4 SPACEs}WHA
   T IS THE PAYMENT AMOUNT";PMT
                              :REM*145
38Ø INPUT"{CRSR DN}{4 SPACEs}HOW
    MANY PAYMENTS MADE";N
                              :REM*251
39Ø INPUT"{CRSR DN}{4 SPACEs}WHA
   T IS THE INTEREST RATE";I
                                :REM*7
4ØØ RI=I/12                   :REM*177
41Ø X=(RI/1ØØ)+1:Y=X{UP ARROW}N:
   Z=Y*PV                     :REM*169
42Ø XX=X*PMT:ZZ=Y-1:YY=RI/1ØØ:ZX
   =ZZ/YY:ZY=XX*ZX:BA=Z-ZY
                              :REM*221
43Ø BL=INT(BA/Ø.Ø1)*Ø.Ø1:REM*153
44Ø BL$=STR$(BL+.ØØ1):BL$=MID$(B
   L$,2,(LEN(BL$)-2))         :REM*219
```

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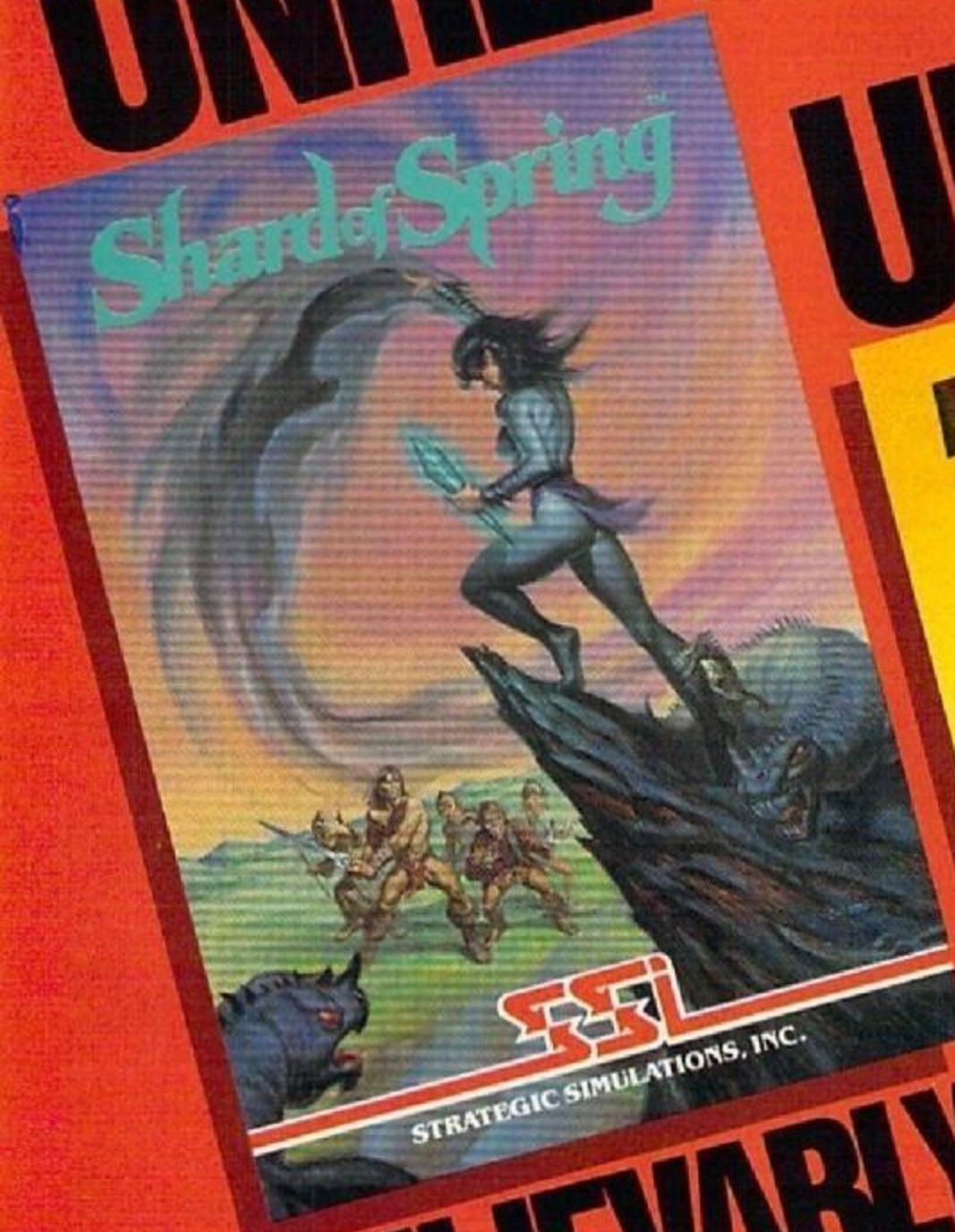

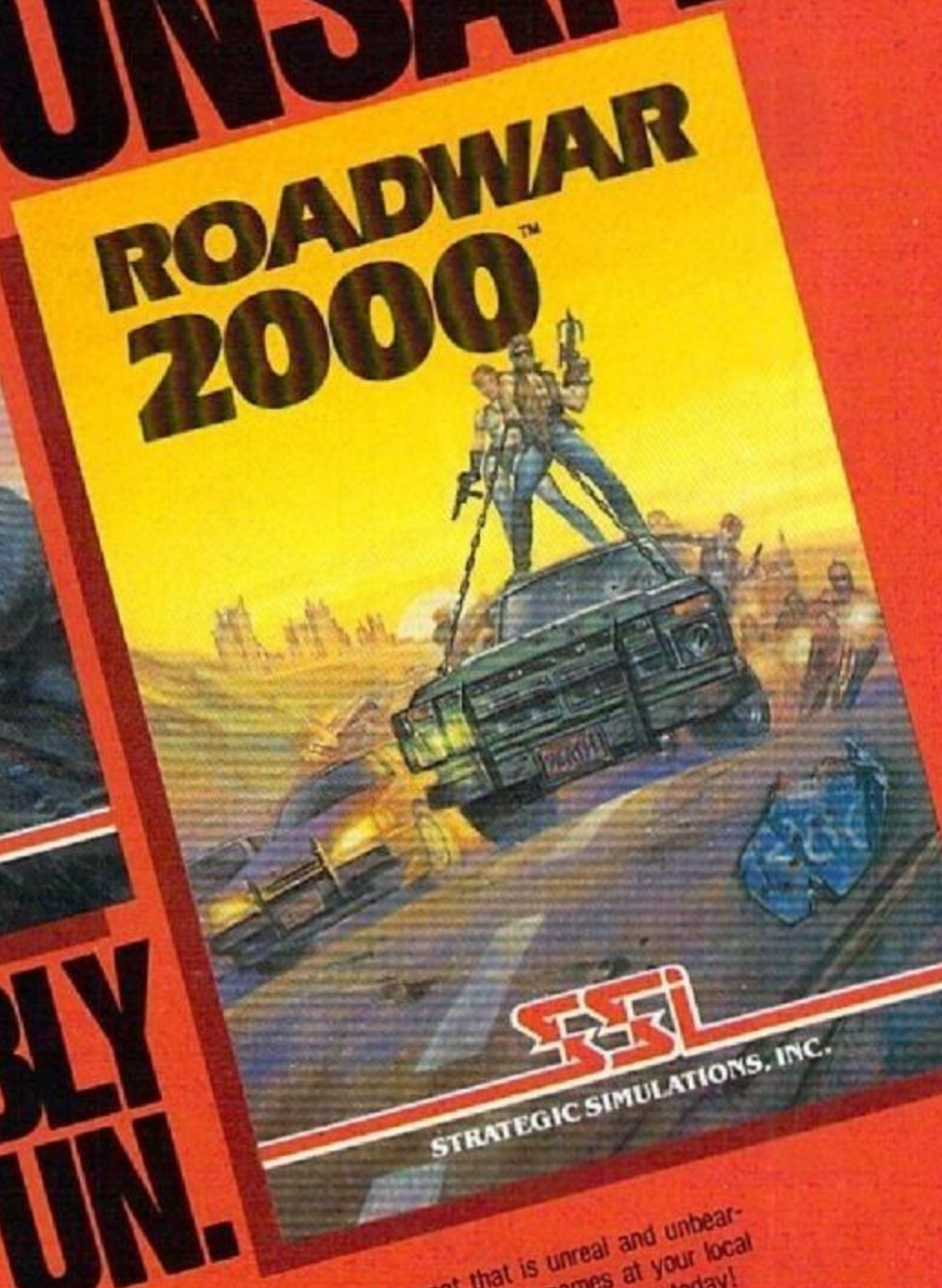

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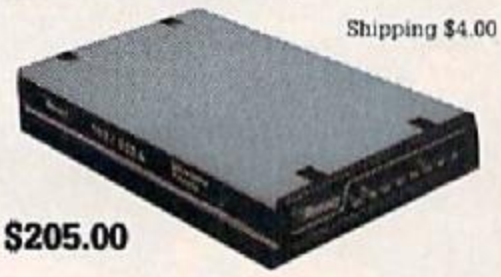

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```
45Ø PRINT"{CRSR DN}{4 SPACEs}REM
    AINING BALANCE IS ";BL$
                              :REM*9
46Ø PRINT"{3 CRSR DNs}{12 SPACEs
    }{CTRL 9}{2 SPACEs}ANOTHER Y
    /N{2 SPACEs}{CTRL Ø}"
                              :REM*219
47Ø GETA$:IFA$<>"Y"ANDA$<>"N"THE
    N47Ø                      :REM*1Ø1
48Ø IFA$="N"THENRUN14Ø        :REM*2Ø9
49Ø IFA$="Y"THENRUN35Ø        :REM*127
5ØØ PRINT"{SHFT CLR}"         :REM*235
51Ø PRINTSPC(3)"{3 CRSR DNs}L O
    A N{2 SPACEs}A M O R T I Z{S
    HFT SPACE}A T I O N":REM*229
52Ø INPUT"{2 CRSR DNs}{5 SPACEs}
    AMOUNT OF LOAN---$";A:I=A
                              :REM*2
53Ø INPUT"{CRSR DN}{5 SPACEs}INT
    EREST RATE IN %";B        :REM*62
54Ø INPUT"{CRSR DN}{5 SPACEs}DUR
    ATION OF LOAN IN MONTHS";C
                              :REM*58
55Ø PRINT"{2 CRSR DNs}{4 SPACEs}
    DO YOU WANT HARD COPY (Y/N)"
                              :REM*124
56Ø GETZ$:IFZ$<>"Y"ANDZ$<>"N"THE
    N56Ø                      :REM*34
57Ø Z=Ø:IFZ$="Y"THENZ=1:GOTO59Ø
                              :REM*138
58Ø PRINT"{SHFT CLR}":PRINT" #{4
     SPACEs}PMT{7 SPACEs}INT{5 S
    PACEs}PRIN{7 SPACEs}BAL{2 SP
    ACEs}"                    :REM*8
59Ø PRINT:Y=1                 :REM*192
6ØØ D=A/(((1-(1+B/12ØØ){UP ARROW
    }-C)/(B/12ØØ)))           :REM*76
61Ø E=B/12ØØ*A:F=D-E:G=A-F:GOSUB
    62Ø:GOTO72Ø               :REM*44
62Ø DD=INT(D/Ø.Ø1)*Ø.Ø1       :REM*2ØØ
63Ø EE=INT(E/Ø.Ø1)*Ø.Ø1       :REM*94
64Ø FF=INT(F/Ø.Ø1)*Ø.Ø1       :REM*246
65Ø GG=INT(G/Ø.Ø1)*Ø.Ø1       :REM*14Ø
66Ø DD$=STR$(DD+.ØØ1):DD$=MID$(D
    D$,2,(LEN(DD$)-2))        :REM*64
67Ø EE$=STR$(EE+.ØØ1):EE$=MID$(E
    E$,2,(LEN(EE$)-2))        :REM*23Ø
68Ø IFEE<1THENEE$="Ø"+STR$(EE+.Ø
    Ø1):EE$=MID$(EE$,2,(LEN(EE$)
    -2))                      :REM*158
69Ø FF$=STR$(FF+.ØØ1):FF$=MID$(F
    F$,2,(LEN(FF$)-2))        :REM*146
7ØØ GG$=STR$(GG+.ØØ1):GG$=MID$(G
    G$,2,(LEN(GG$)-2)):IFGG<=ØTH
    ENGG$="Ø.ØØ"              :REM*144
71Ø RETURN                    :REM*2
72Ø IFZ=1THENPRINT"{SHFT CLR}":P
    RINTTAB(13)"{7 CRSR DNs}{CTR
    L 9} PLEASE{2 SPACEs}WAIT {C
    TRL Ø}"                   :REM*68
725 IFZ=1THENPRINTTAB(13)"{CTRL
    9}{3 SPACEs}PRINTING{3 SPACE
    s}{CTRL Ø}":GOTO88Ø       :REM*229
73Ø PRINTY:PRINTTAB(11-LEN(DD$))
    "{CRSR UP}"DD$:PRINTTAB(2Ø-L
    EN(EE$))"{CRSR UP}"EE$
                              :REM*246
74Ø PRINTTAB(28-LEN(FF$))"{CRSR
    UP}"FF$:PRINTTAB(39-LEN(GG$)
    )"{CRSR UP}"GG$           :REM*168
75Ø C=C-1:A=G:Y=Y+1           :REM*1Ø
76Ø IFC>ØTHEN6ØØ              :REM*25Ø
765 GOSUB77Ø:GOTO8ØØ          :REM*19
77Ø T=VAL(DD$):TT=T*(Y-1):TC=TT-
    I:CT=INT(TC/Ø.Ø1)*Ø.Ø1:TL=IN
    T(TT/Ø.Ø1)*Ø.Ø1            :REM*235
78Ø TT$=STR$(TL+.ØØ1):TT$=MID$(T
    T$,2,(LEN(TT$)-2))        :REM*65
79Ø TC$=STR$(CT+.ØØ1):TC$=MID$(T
    C$,2,(LEN(TC$)-2)):RETURN
                              :REM*165
8ØØ PRINT"{CRSR DN}TOTAL PAYMENT
    S = "TT$:PRINT"{CRSR DN}TOTA
    L COST{5 SPACEs}={2 SPACEs}"
    TC$                       :REM*45
81Ø IFC=ØTHENPRINT"{CRSR DN}{11
    SPACEs}{CTRL 9}{3 SPACEs}ANO
    THER Y/N{3 SPACEs}{CTRL Ø}"
                              :REM*27
82Ø GETA$:IFA$<>"Y"ANDA$<>"N"THE
    N82Ø                      :REM*193
83Ø IFA$="Y"THENRUN5ØØ        :REM*149
84Ø PRINT"{CRSR UP}{1Ø SPACEs}{C
    TRL 9}{3 SPACEs}END PROGRAM
    Y/N{3 SPACEs}{CTRL Ø} "
                              :REM*1Ø3
85Ø GETA$:IFA$<>"Y"ANDA$<>"N"THE
    N85Ø                      :REM*227
86Ø IFA$="N"THENRUN14Ø        :REM*79
87Ø IFA$="Y"THENA$="* * *{2 SPAC
    Es}T{SHFT SPACE}H{SHFT SPACE
    }A{SHFT SPACE}N K{2 SPACEs}Y
     O U{2 SHFT SPACEs}* * *":PR
    INT"{SHFT CLR}{6 CRSR DNs}":
    GOSUB9Ø                   :REM*9
875 PRINT"{CTRL 1}":END       :REM*2
88Ø REM *** PRINTER ROUTINE ***
                              :REM*53
89Ø E$=CHR$(27):H$=CHR$(9)
                              :REM*219
9ØØ OPEN4,4:CMD4              :REM*127
91Ø PRINT                     :REM*247
92Ø PRINT"{19 SPACEs}**** LOAN A
    MORTIZATION SCHEDULE ****"
                              :REM*63
93Ø PRINT                     :REM*11
94Ø PRINT"{11 SPACEs}AMOUNT OF L
    OAN{5 SPACEs}= $"A        :REM*247
95Ø PRINT"{11 SPACEs}INTEREST RA
    TE{6 SPACEs}={2 SPACEs}"B"%"
                              :REM*123
96Ø PRINT"{11 SPACEs}LENGTH OF L
    OAN{5 SPACEs}={2 SPACEs}"C"M
    ONTHS"                    :REM*77
97Ø PRINT:K=Ø:P=1:Y=1         :REM*189
98Ø PRINT"{2 SPACEs}PMNT #{8 SPA
    CEs}PMNT{1Ø SPACEs}INTEREST{
    8 SPACEs}PRINCIPAL{6 SPACEs}
    BALANCE"                  :REM*1Ø9
99Ø PRINT                     :REM*71
1ØØØ D=A/(((1-(1+B/12ØØ){UP ARRO
    W}-C)/(B/12ØØ)))          :REM*221
1Ø1Ø E=B/12ØØ*A:F=D-E:G=A-F:GOSU
    B62Ø                      :REM*229
1Ø2Ø Y$=STR$(Y)               :REM*43
1Ø3Ø PRINT#4,""TAB(5-LEN(Y$))Y$;
                              :REM*212
1Ø4Ø PRINT#4,""TAB(16-LEN(DD$))D
    D$;                       :REM*1Ø6
1Ø5Ø PRINT#4,""TAB(16-LEN(EE$))E
    E$;                       :REM*224
1Ø6Ø PRINT#4,""TAB(16-LEN(FF$))F
    F$;                       :REM*86
1Ø7Ø PRINT#4,""TAB(16-LEN(GG$))G
    G$                        :REM*1ØØ
1Ø8Ø C=C-1:A=G:K=K+1:Y=Y+1
                              :REM*152
1Ø9Ø IFK=42THEN115Ø           :REM*2Ø2
11ØØ IFC>ØTHEN1ØØØ            :REM*14Ø
111Ø GOSUB77Ø:CMD4            :REM*84
112Ø PRINT:PRINT"{2 SPACEs}TOTAL
     PAYMENTS = "TT$          :REM*2ØØ
113Ø PRINT:PRINT"{13 SPACEs}TOTA
    L COST = "TC$             :REM*52
114Ø IFC=ØTHENPRINT#4:CLOSE4:PRI
    NT"{SHFT CLR}{1Ø CRSR DNs}"
    :GOTO81Ø                  :REM*176
115Ø CMD4:P=P+1:PRINT:PRINT"{8 S
    PACEs}CONTINUED ON NEXT PAG
    E":K=Ø                    :REM*12
1155 FORT=1TO8:PRINTCHR$(1Ø):NEX
    T                         :REM*155
116Ø PRINT"{35 SPACEs}PAGE #"P:P
    RINT:PRINT:PRINT          :REM*17Ø
117Ø PRINT"{2 SPACEs}PMNT #{8 SP
    ACEs}PMNT{1Ø SPACEs}INTERES
    T{8 SPACEs}PRINCIPAL{5 SPAC
    Es}BALANCE"               :REM*94
118Ø PRINT                    :REM*6
119Ø GOTO11ØØ                 :REM*128
```

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A-53 Division III
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Focus on Screen Shots

By ERVIN BOBO

Taking high-quality photographs of your screen displays is a snap if you follow the advice of this professional photographer.

Screen shots are useful for several reasons. You may wish to send a picture of your best graphics program to someone who has no computer, or include pictures when you submit a program for publication by a magazine or a software company. Or perhaps you want to prove your prowess in a game that doesn't save high scores to win a friend's admiration or a prize from the software publisher.

Whatever your reasons and regardless of your background in photography, you can make screen shots easily when you understand and follow a few simple rules.

Use a Tripod

All good photographers understand the need for a camera to be absolutely steady at the instant of exposure. If they could, most would drive a shaft and anchor it in bedrock, then mount the camera in a vise welded to the top of the shaft. Failing that, buy the best tripod you can afford. Avoid the so-called "pocket" tripods that collapse to a length of about 12 inches. They are usually so frail that the legs will bow—rather like a spring—under the weight of the camera.

If your budget permits, purchase a tripod with a center brace between the legs. The brace increases steadiness and also prevents an accidental kick from folding the tripod up and dumping your camera. You should be able to find one for about $40.

No matter what your selection, make sure the movable head locks tight. You should be able to position and then tighten it so it will move only with great effort.

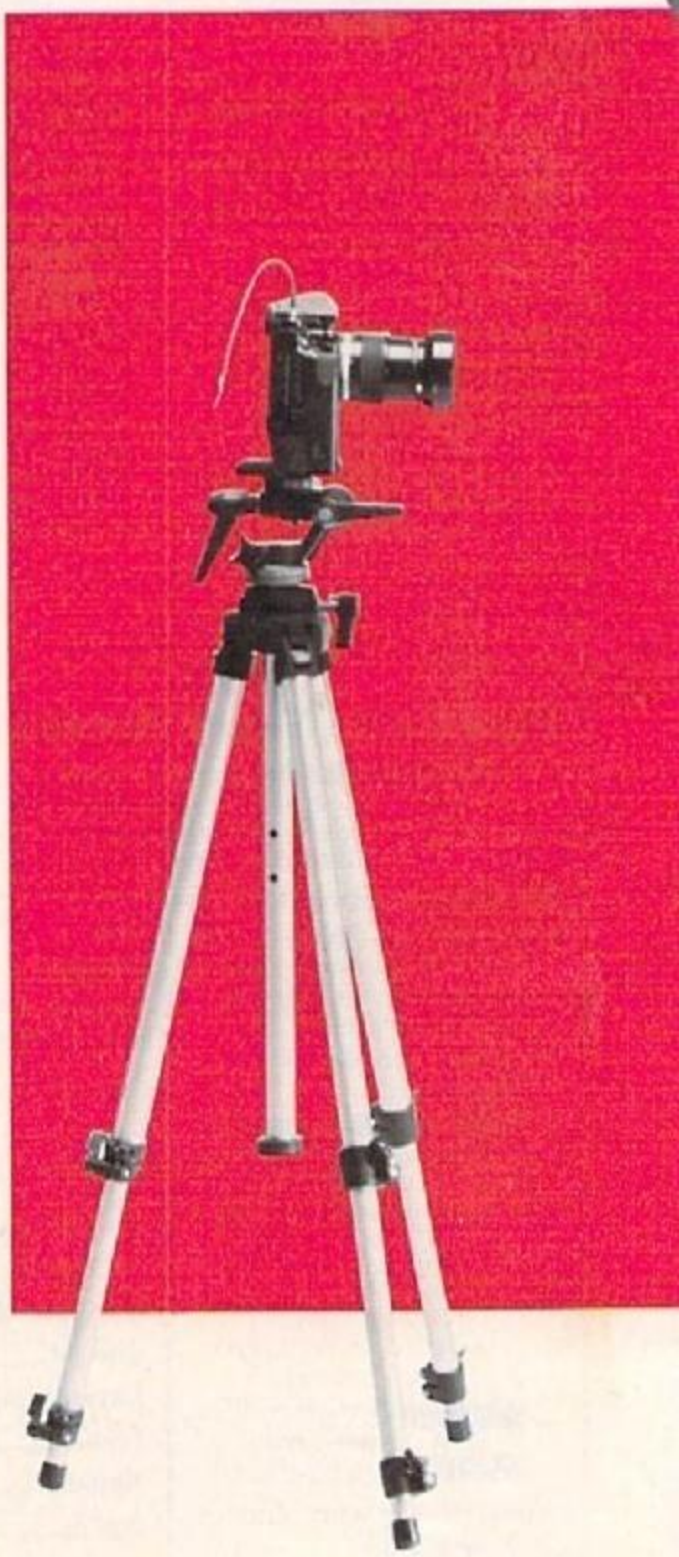
The elevation column should also lock tight. Avoid the smooth, friction type; instead, choose one with a geared crank. When it's locked, you should be able to press down hard on the head without the column slipping.

Now, once you've bought that tripod, what do you put on it?

The Camera

There is no substitute for a single lens reflex (SLR) camera. In this type, a mirror arrangement enables the viewfinder to operate through the same lens that makes the picture. Because you see exactly what will register on the film, you can be precise in focusing and aligning your camera to photograph only the monitor screen, avoiding the clutter on your computer desk.

There are enough choices within the SLR family to confuse even the professional photographer, but we can eliminate half at the start. However, if you already have an SLR that does not measure up to the following criteria, don't despair.



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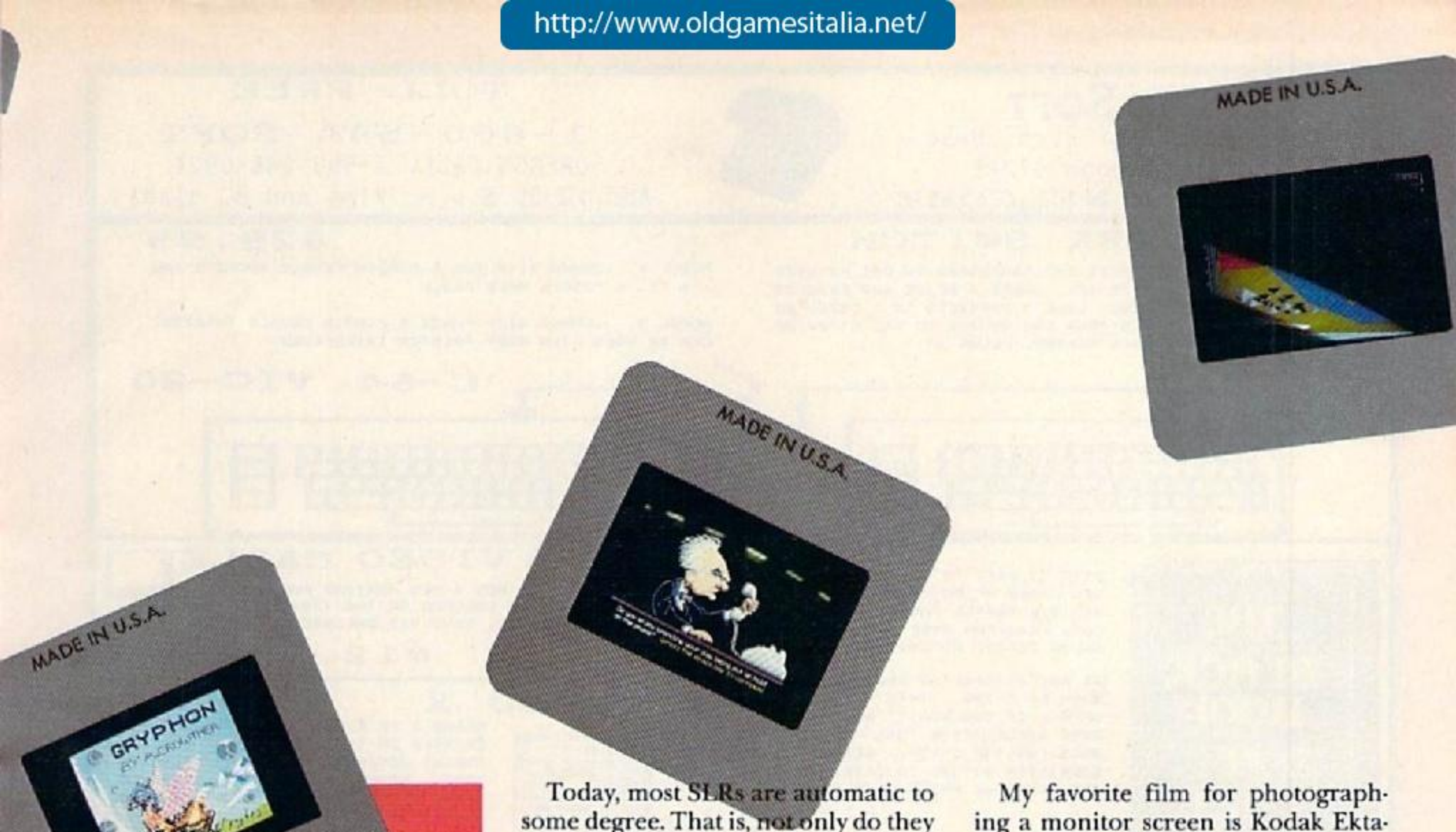

Today, most SLRs are automatic to some degree. That is, not only do they measure the amount of light striking the lens, but they also adjust so that the correct amount for a proper exposure reaches the film.

When photographing Aunt Martha in Yellowstone Park, any camera may do. However, control of shutter speed is essential in photographing a monitor screen (for reasons I'll explain later). Therefore, if you buy a camera for this purpose, select a "shutter-preferred" automatic. With this type, you select the shutter speed, and the camera then selects the proper aperture (lens opening) to go with it.

Manual-exposure SLRs can be obtained today for about $150 and up. Shutter-preferred automatics start at about $200 and shutter- or aperture-preferred models start at about $250. (Although an aperture-preferred camera *can* be used, it's more difficult, requiring constant monitoring and adjustment, so I would avoid it.)

So, now that you've got your camera, what do you put in it?

The Film

New photographers often make the mistake of buying the "fastest" (most light-sensitive) film available. Operating on the theory that more is better, they're convinced that a high-speed film will enable them to take pictures of anything, anytime, anywhere—and they remain convinced until their first action shot on a sunny day in July.

My favorite film for photographing a monitor screen is Kodak Ektachrome 100. The 100 refers to the emulsion speed, or light sensitivity, of the film, and by today's standards it's probably slow. For our purposes, however, slow is good.

Kodachrome 64 is another very good film, but Ektachrome gets my vote because most photo shops can develop it quickly, getting the finished slides into my hands about two days sooner than they could with Kodachrome.

Notice that I said *slides*. There are several reasons you should never use print film for photographing a screen. For instance, if you're hoping to get your photograph published, magazines and other print media work best from slides (properly called transparencies). Another compelling factor has to do with the way color prints are made.

The only way photofinishers can keep up with volume these days is by using automated printers, which are set up for an average mixture of colors. This system works fine until the machine receives a negative containing a preponderance of one color—as might be found on a monitor screen. An automatic printer would attempt to balance a blue screen with light blue or white type to "average," resulting in a photo with color distortion.

Slides, on the other hand, suffer no such manipulation. The finished product is exactly what you shot.

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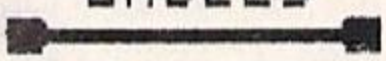

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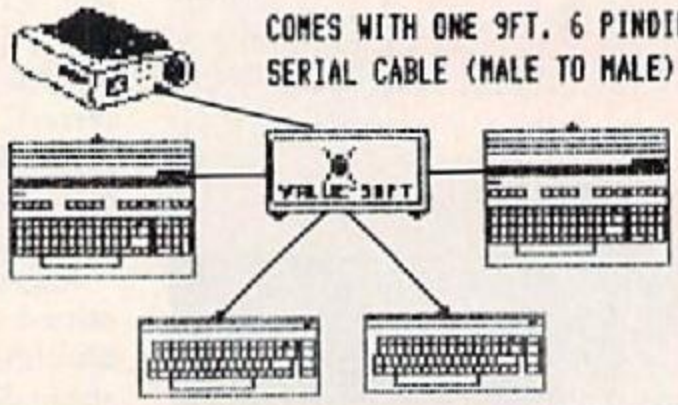

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Colors are true and sharpness is as good as your focusing; and in screen shots these parameters, as well as framing, are the ones that matter.

Framing the Picture

Framing means taking a photo only of your monitor screen, not half of your computer desk as well. In order to isolate the monitor from its surroundings, you must use close-up lenses.

Such lenses, sometimes referred to as diopters, screw directly onto the lens housing of your camera, exactly as filters do, and optically change the focusing abilities of the camera's lens. Most normal camera lenses, 45 to 55 mm in focal length, focus as close as 18 inches. The diopter allows you to shorten this distance and fill the film frame with just the monitor screen.

Today, diopters are usually sold in sets of three, with values of +1, +2 and +4. They may be used separately or in combination, depending on how close you wish to be. I find that either a +1 or +2 is right for my needs. The price of a set of diopters varies, depending on the size needed to fit your lens, but you should be able to obtain a good set for less than $40.

When purchasing diopters, be sure to specify the filter size of your camera, rather than the focal length of your lens. Both numbers are marked on the lens housing and are frequently confused. The filter-size number is usually followed by a slashed zero.

Don't panic if, in framing, you find you can't avoid showing part of the monitor's picture-tube opening in the image. The height-width ratio of a 35mm film frame is 2:3, while the same ratio for the monitor screen is 3:4. You'll never get an exact match, but you will come close. Opt for getting some of the monitor casing in the photo rather than blocking it out by photographing only the center of the screen.

Because you're using an SLR and looking through a diopter as well as the lens, you'll find no trouble in focusing. And because the light meter in the camera takes its readings from the same vantage point, you'll have no need to compensate for the close-up lens. Take the exposure as indicated by the light meter display in your viewfinder and use it.

The Exposure

You should always give preference to the shutter speed, for this is the most important factor in the expo-

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sure process when photographing a monitor screen. You probably know that images on a TV or monitor screen consist of lines "drawn" horizontally on the inside of the screen. An entire frame is drawn, from top to bottom, in 1/30 of a second. Due to persistence of vision, we do not perceive the individual frames, but a continuous flow.

Your camera sees differently. The shutter in most 35mm SLRs is a curtain with a vertical slit in it that moves horizontally across the film. Because the monitor image is drawn from top to bottom, a shutter speed faster than 1/30 of a second will result in a photo of a partially formed image. There might be a narrow band extending from the upper left to lower right (high shutter speed), or a dark shadow across an otherwise good slide (medium shutter speed).

For this reason, slow shutter speeds are best, and, as I've said, control over this aspect of picture-taking is most easily achieved with a shutter-preferred automatic camera. With your camera in place on the tripod, a close-up diopter on your lens and the best framing you can get, set your shutter speed to 1/8 or 1/4 of a second. Now, a little rudimentary math will tell you that, if the shutter is open for that long, the camera will register more than one frame. Exactly right, but unless there is a big change between successive screen images, it won't matter.

In fact, it will result in a better image on your film, because you're eliminating the chance of a partial image by photographing two or more frames. (Two frames at 1/8 of a second. If your calculations give you four, because 1/8 is approximately four times 1/30, it's because I didn't tell you about the blanking interval between frames. But let's not go into that.)

Now you see the reasons for locking the camera onto a steady tripod. Most people cannot hold a camera steady for an interval of 1/8 of a second.

Once you've set the shutter speed and locked it in, the automatic exposure mechanism in the camera will adjust the aperture correctly. Whether you're photographing a mostly black space scene or the brightly lighted instrument panel of a flight simulator, the exposure will be correct and you'll never have to change the shutter speed.

If you have an aperture-preferred automatic camera, as I mentioned, things are going to be trickier. Here, you set the lens opening and the camera selects the proper shutter speed for correct exposure. In photographing your monitor screen, this means you have to adjust the aperture until the shutter-speed indicator shows you have a working speed within the 1/8- to 1/4-second range. Using this type of camera is more work, but it can be done, and if it's the kind you own, use it.

A manual camera works like a combination of the two just mentioned. Because it's manual, you can set the shutter speed and never have to worry about it again. As screens change, you simply adjust the aperture until the exposure indicator needle is centered in its bracket or (depending on the camera) until the LED display indicates a correct setting.

Tips on Technique

Before snapping the picture, inspect the image in the viewfinder carefully. Look for signs of glare on the monitor screen. These must be eliminated.

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lights behind me provide the light by which I work—and also create interesting reflections on the screen. Normally, these reflections are no bother because my mind and eye work together to see only what they wish to see—selective vision. However, a camera sees everything.

To eliminate the reflections during a photo session, I turn off all lights but one small fluorescent at the far end of the room. It provides just enough illumination to see my camera settings clearly. In the absence of such an arrangement, I would advise turning out all lights, drawing shades and working by the light of a penlight or the monitor itself.

Although it should be obvious, a clean monitor screen is as imperative as one free of reflections. Be sure you've removed all dust and fingerprints and that your glass cleaner has completely dried before taking any photographs.

As a final note on technique, I would advise that if the game routine you're photographing has a "demo" mode, use it. It can be very tricky to handle a joystick and camera simultaneously. An alternative is to have someone else play the game while you photograph it (the best use I can think of for a kid brother!). Programs with a "pause" feature that freezes the action are best of all, allowing pictures of explosions, lasers and the like and enabling you to work at a leisurely pace.

And what do you do with the finished product?

The Slides

If you've never worked with slide film before, you'll find that the transparencies will return from your photofinisher already installed in cardboard or plastic mounts. (If he asks if you want them mounted, say yes.)

However, mounting won't protect them from dust and fingerprints. If you don't touch it first, dust is easy to clean off with a blower brush of the kind used to clean camera lenses. Your photo salesman will be glad to sell you one. Gently squeezing the bulb directs a puff of air at the dust on the slide, and a whisk of a camel's-hair brush will take care of any that's left.

Fingerprints are another matter. The oils of your hand can eat into the photographic emulsion, permanently etching your fingerprint into the slide. While this may be an excellent way to provide identification and prosecute unauthorized use, it's not recommended.

Handle slides only by the edges of the mounts. Store them in the little plastic boxes in which they were returned to you, and, if you should have to mail them somewhere, don't drop them loosely into an envelope. Instead, purchase a supply of transparent vinyl album pages made for slides. These provide adequate protection, and the slides can be viewed without being removed. If you don't want to waste an entire page for only a few slides, then cut the page into strips of four or five pockets.

So, there you have it—screen shots with photographic equipment you probably already have—and a minimum of fuss. I hope they help you sell your program or win that cherished gaming trophy. R

Ervin Bobo, 23 St. Lawrence, St. Peters, MO 63376, is a professional photographer.

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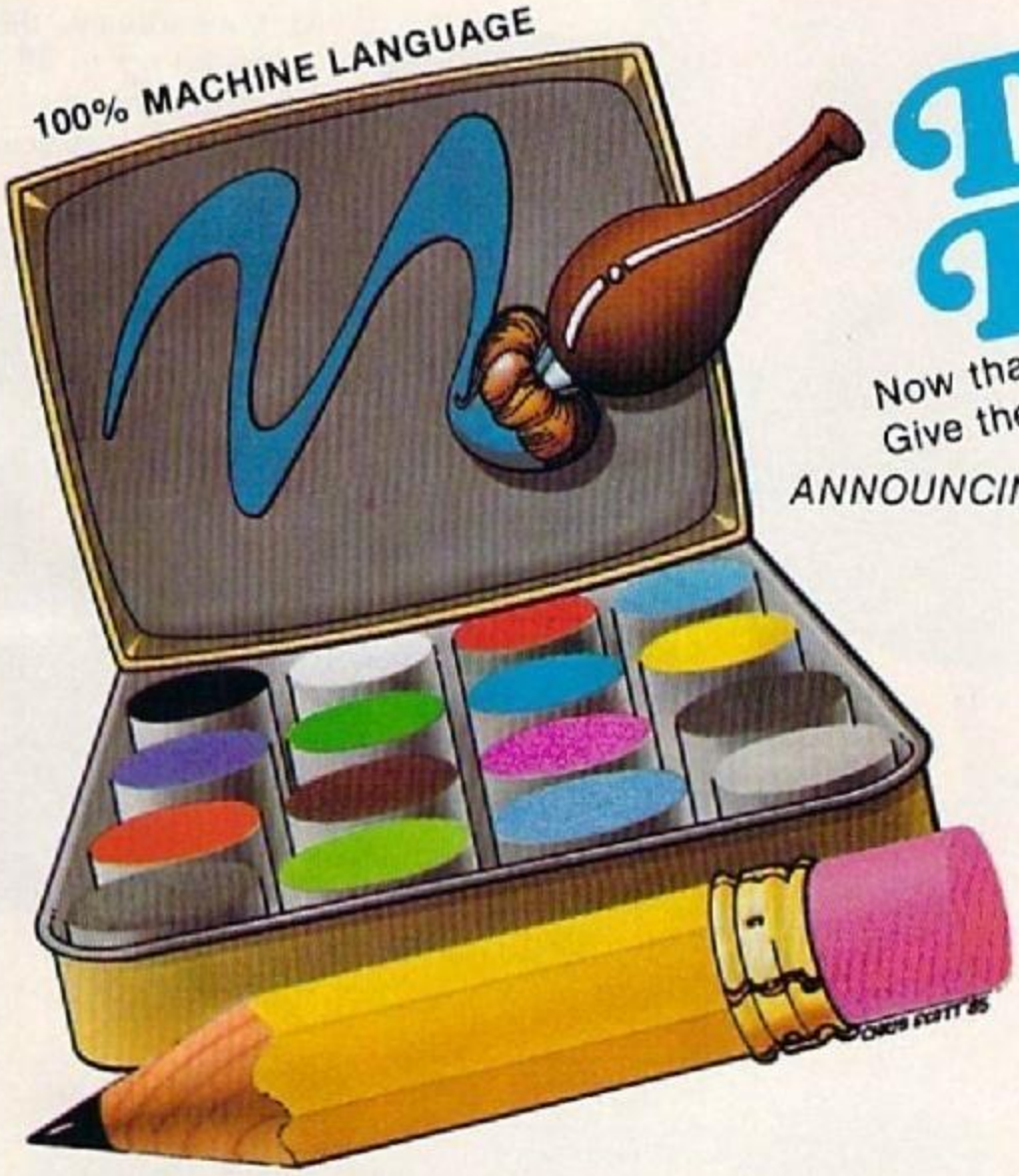

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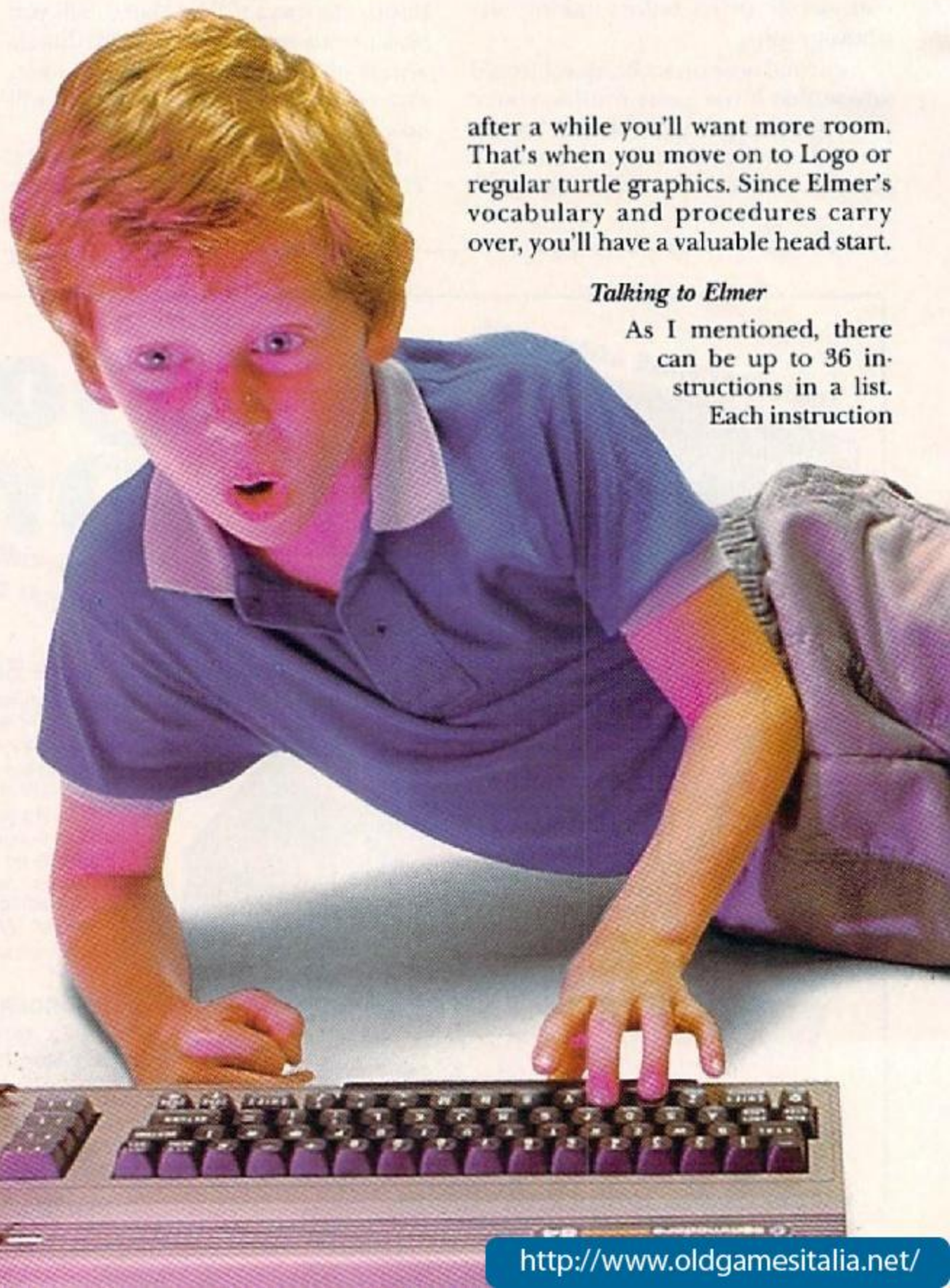

Children under six or seven are fascinated by computers, but limited in what they can create with them, since they can't read or handle detail well enough to program. I wrote Elmer the Turtle, an introductory turtle-graphics program, for my own children so they could start to program, and I've found that it can be useful fun for beginning adults, too.

Elmer is a pen-wielding "turtle" who moves about the screen and draws according to a list of instructions you create by copying choices from a menu. The programming is done with only two screens, the second following the first automatically. There's no switching from menu to menu as in more advanced programs like Logo. Eleven simple statements are sufficient to put Elmer through reasonably complex maneuvers, and four rudimentary editing commands enable you to arrange the program listing.

The program is reasonably crash-proof. If you type in garbage, Elmer just says he doesn't understand and would you please try again. If it does crash, you can usually restart it without losing anything by typing GOTO 700.

The statement list for Elmer is limited to 36 lines so that they'll all fit on one screen. Obviously, after a while you'll want more room. That's when you move on to Logo or regular turtle graphics. Since Elmer's vocabulary and procedures carry over, you'll have a valuable head start.

Talking to Elmer

As I mentioned, there can be up to 36 instructions in a list. Each instruction

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has a line number. After a couple of introductory screens that explain what the program is about, a display appears with an empty list of all the line numbers and, at the bottom, a menu of three choices.

You can go to a line number you specify to write in an instruction; you can type E to make Elmer follow the instructions you've already written; or you can type NEW to clear your list and start afresh. Of course, when you're just beginning to play, only the first choice, writing instructions, is viable. So, type in the line number you want—probably 1—and hit the return key. The next screen displays all the possible instructions for making Elmer walk and draw, and for editing the list. (See Table 1.)

Choose a direction for Elmer to walk by typing the appropriate word, then tell him how many steps he should take in that direction. You must include the number—he won't understand otherwise. When you press the return key again, your instruction will appear at the specified line number in the list.

To make Elmer draw, tell him PEN DOWN. He'll place his pen on the screen and draw a trail behind him. When you say PEN UP, he'll lift the pen and leave no mark at all. The drawing instructions need no following numbers.

Elmer usually uses an asterisk for drawing his trail, because he thinks it looks like a turtle. However, he'll draw with any other character you choose. Just type the instruction CHAR, followed by a space and the character you want. For example, CHAR E makes him leave a trail of *E*s. You can request any letter, number or punctuation mark on the keyboard except the Commodore graphics symbols.

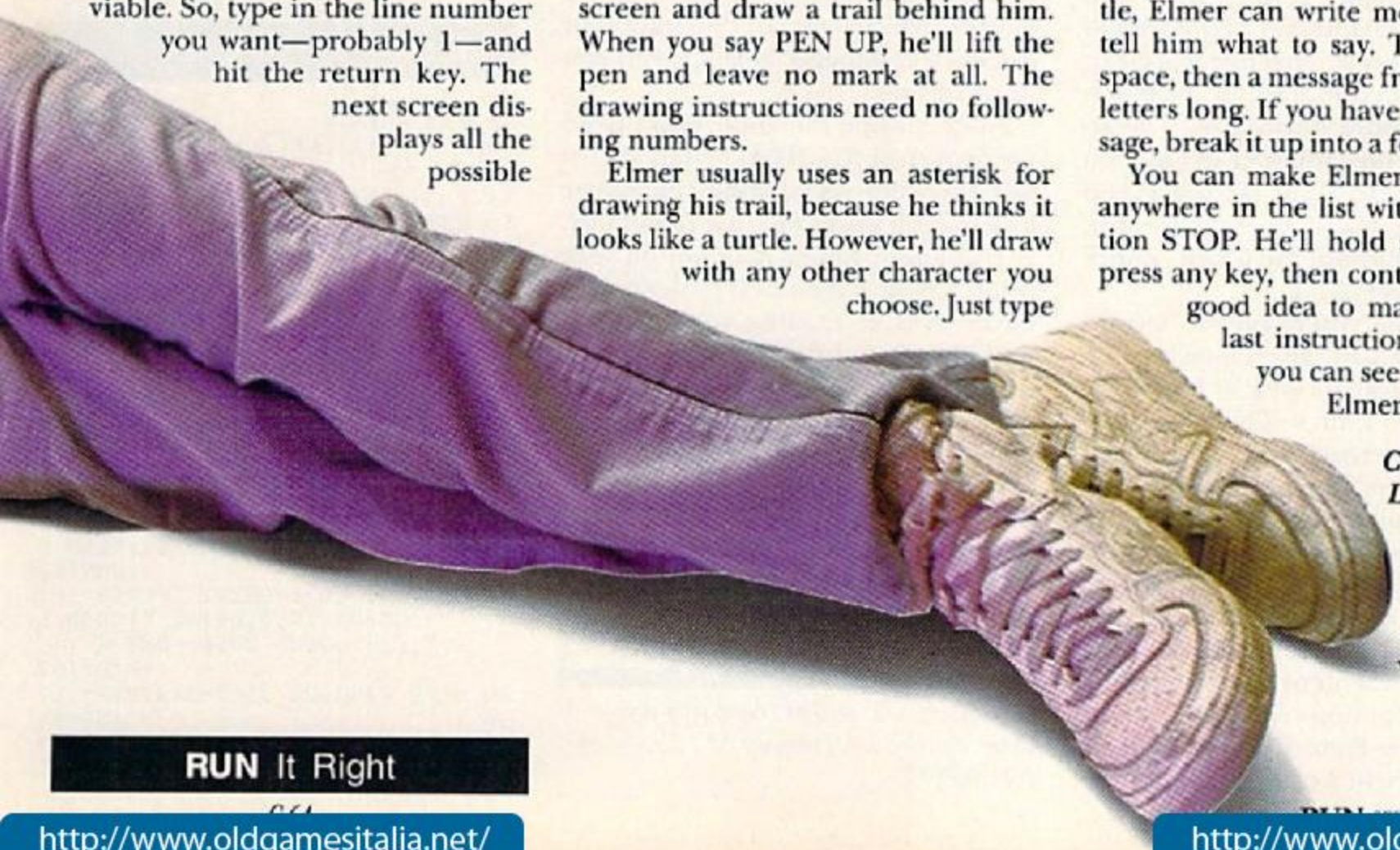
Elmer can draw in 16 different colors (listed in Table 2). To change color, type COLOR, a space and the number of your choice, 0 to 15. If you have a monochrome monitor, you can choose from seven shades.

Even though he's just a silly old turtle, Elmer can write messages if you tell him what to say. Type TEXT, a space, then a message from one to ten letters long. If you have a longer message, break it up into a few short ones.

You can make Elmer stop moving anywhere in the list with the instruction STOP. He'll hold still until you press any key, then continue on. It's a good idea to make STOP the last instruction on a list, so you can see what you and Elmer have created.

Changing the List

You can alter Elmer's instructions in various ways



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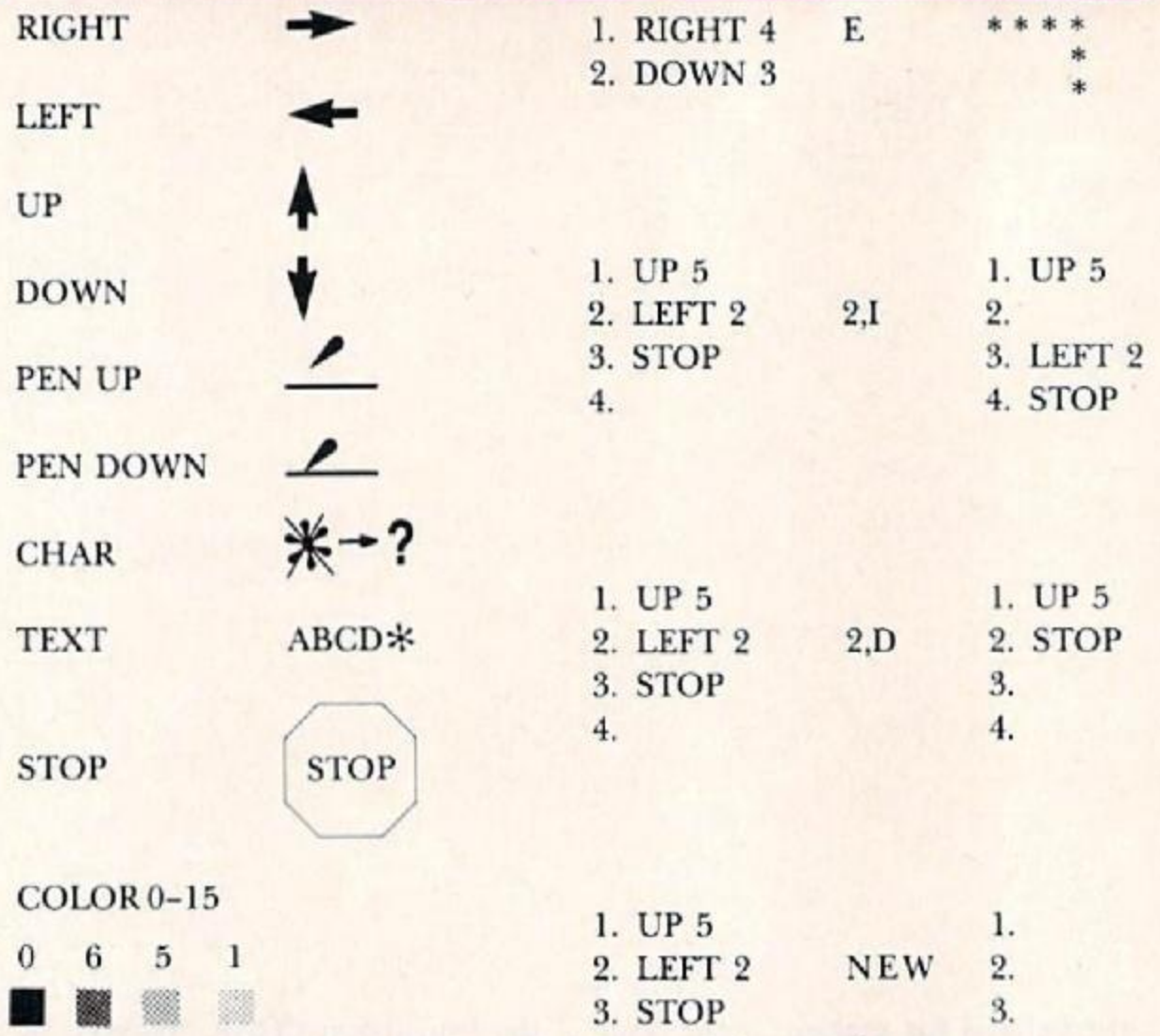

Figure 1. *Prompt card of commands for non-readers.*

after you've written them. As I mentioned earlier, NEW erases the whole list. To erase only one line, specify the line number, then type D for delete. The instruction at that line number will disappear, and all the ones below it will move up.

If you need to change an instruction instead of erasing it, type the new version after designating the line number. To add a line between two others, type the number of the second and an I for insert. That line will clear, and its instruction and all those following will move down. Then, by accessing that line number again, you can fill in the blank. By the way, if you should leave blank lines in the list, Elmer won't mind. He'll just ignore them and plod along.

At any time you're on the second menu screen, you can change the line number you're working at by typing B, for Back to Line #. This recalls the first menu screen, where you can choose another line number.

Although all the commands are displayed on the screen, I also keep explanatory notes by the computer for the children to refer to. For those who can read, I provide a list of the commands, with a sentence describing the use of each. For non-readers, I've made up a card (see Figure 1) with little descriptive sketches of most of the instructions to Elmer (on the left) and brief examples (on the right) of how the E and editing commands work.

You'll have to explain the E and editing command examples thoroughly at first, but once the child understands, they'll serve as good reminders. In each example, you start with the instructions on the left, then enter the command in the middle to produce the result on the right. I never came up with an illustration of the Back command. Perhaps you can think of one.

After a while the child won't need the card at all. You'll be amazed at how fast even the very young remember how to spell words they use frequently.

You know, Elmer may not be very smart, but he has endless patience. He never tires of reading your list and walking around the screen following directions. He tells you when he doesn't understand, and gives you as many tries as you need to get it right.

Nowadays, when I'm done using our Commodore, I load in Elmer the Turtle and leave it on. More often than not, some visitor passes by and starts to play. Bingo!—another programmer is born. R

Address all author correspondence to Peter Crosby, 24 Tremont St., Claremont, NH 03743.

RIGHT
UP
DOWN
INSERT
LEFT
PEN UP
PEN DOWN
DELETE
CHAR
COLOR
TEXT
BACK TO LINE #
STOP

Table 1. *Commands for directing Elmer and for editing the instruction list.*

0 BLACK
1 WHITE
2 RED
3 CYAN
4 PURPLE
5 GREEN
6 BLUE
7 YELLOW
8 ORANGE
9 BROWN
10 LIGHT RED
11 DARK GRAY
12 MEDIUM GRAY
13 LIGHT GREEN
14 LIGHT BLUE
15 LIGHT GRAY

Table 2. *Color choices.*

Listing 1. *Elmer the Turtle program.*

```
10 REM ARRAYS                    :REM*18
12 DIM B(12),A$(36),B$(36),C$(12
   )                             :REM*50
14 :                             :REM*246
16 REM TITLE                     :REM*196
18 POKE 5328Ø,7:POKE 53281,7
                                 :REM*192
2Ø A$="*":TL=4Ø:PRINT "{SHFT CLR
   }{CTRL 7}{5 SPACEs}";A$;:FOR
   F=1 TO 3                      :REM*252
22 FOR A=1 TO 6:GOSUB 275Ø:PRINT
    "{CRSR LF} {CRSR LF}{CRSR DN
   }";A$;:NEXT A                 :REM*13Ø
24 FOR A=1 TO 5:GOSUB 275Ø:PRINT
    "{CRSR LF} {2 CRSR LFs}";A$;
   :NEXT A                       :REM*2Ø2
26 GOSUB 275Ø:PRINT "{CRSR LF} {
   CRSR LF}{CRSR DN}";A$;:READ B
   $:GOSUB 295Ø                  :REM*82
28 FOR A=1 TO 5:PRINT "{CRSR LF}
    ";:GOSUB 275Ø:PRINT "{CRSR L
   F}";A$;:GOSUB 275Ø:NEXT A
                                 :REM*162
29 NEXT F:GOSUB 255Ø:D=Ø:REM*167
3Ø :                              :REM*6
32 REM INSTRUCTIONS              :REM*64
```

→

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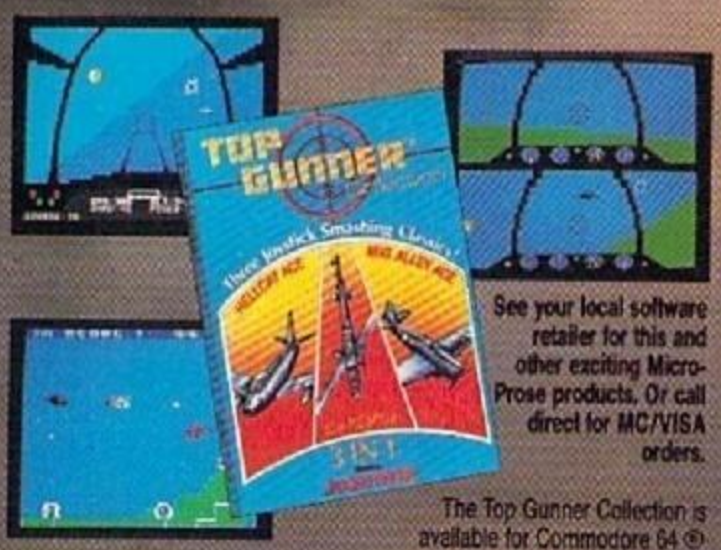

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RUN Basic

Add a host of powerful graphics commands to Basic 4.5 and turn your C-64 into the graphics machine it was meant to be.

By ROBERT ROCKEFELLER

RUN Basic, an extended Basic for the C-64, adds 30 new commands to Basic 4.5 (published in *RUN*'s June, July and August 1985 issues). RUN Basic includes commands for graphics, structured programming and named subroutines with local variables, among other features. It is aimed at fairly competent programmers, and even they will need to closely examine the demo programs to learn how to use these new powerful commands effectively.

Turtle Graphics

Most of RUN Basic's commands are for turtle graphics, so we'll start with a description of these. In most forms of turtle graphics, the cursor is a crude representation of a turtle, to be imagined as holding a pen. You move the turtle with commands such as

```
AHEAD 30: TURNTO HEADING + 1:
BACK 59
```

When the turtle pen is down, you may draw or erase lines on the screen; when it's up, you can move the turtle without having it draw anything.

RUN Basic doesn't use a turtle because it slows the drawing process. For the sake of consistency, however, I refer throughout this article to the current position of the drawing pen on the hi-res screen as a turtle.

When plotting turtle graphics, RUN Basic uses a standard Cartesian coordinate system with the origin (0,0) at the lower left of the screen. The screen is 320 pixels wide and 200 pixels high.

Many of RUN Basic's turtle graphics commands require you to supply a color in the parameter string. The colors are specified as follows:

0—black	8—orange
1—white	9—brown
2—red	10—light red
3—cyan	11—dark gray
4—purple	12—medium gray
5—green	13—light green
6—blue	14—light blue
7—yellow	15—light gray

Turtle Graphics Commands

HIRES. Command format: HIRES <screen-color (0–15, plot-type-color1 (0–15)>.

HIRES initializes a high-resolution bit-map graphics screen, but it does not clear the screen. This permits the Hi-res mode to change the current colors while drawing. It also permits all 16 colors to be displayed simultaneously on the high-resolution screen. Each block of the hi-res screen is eight pixels wide and eight pixels high and can have a unique screen and plot color combination. Sample RUN Basic line:

```
10 HIRES 1,0 : REM WHITE HI-RES GRAPHICS SCREEN WITH BLACK PIXELS
```

MEDRES. Command format: MEDRES <screen-color (0–15), plot-type-color #1 (0–15), plot-type-color #2 (0–15), plot-type-color #3 (0–15)>.

MEDRES is similar to the HIRES command except that it initializes a multi-color graphics mode. In Med-res mode, each four-pixel-wide by eight-pixel-high block of the med-res screen can simultaneously display three different colors, plus the screen color. By using MEDRES to select new drawing colors, all 16 colors can appear on the same med-res screen. Sample RUN Basic line:

```
10 MEDRES 0,7,3,4: REM YELLOW, CYAN & PURPLE DRAWING COLORS ON A BLACK SCREEN
```

TEXT. Command format: TEXT.

The TEXT command reverts the screen from Hi-res or Med-res mode to the text screen. Sample RUN Basic line:

```
10 TEXT: REM TO LOW-RES SCREEN
```

GCLR. Command format: GCLR.

GCLR clears the graphics screen. This command should be executed at the beginning of every RUN Basic turtle graphics program, to clear the graphics screens. Sample RUN Basic line:

```
10 GCLR: REM CLEARS HIRES & MEDRES SCREENS
```

PEN. Command format: PEN <plot-type (0–3)>.

PEN determines whether RUN Basic's pen will draw or erase when lowered. Following is a description of each plot type.

0—Erases with screen color in Hi-res or Med-res mode.
1—Plots in Hi-res mode with the plot-type color selected in the HIRES command. In the Med-res mode, drawing will be done with plot-type color #1.
2—Plots in Med-res mode with Med-res color #2.
3—Plots in Med-res mode with Med-res color #3.

Sample RUN Basic lines:

```
10 PEN 0: REM LINE ERASES AS IT PLOTS
10 PEN 3: REM LINE DRAWS AS IT PLOTS
```

PENUP. Command format: PENUP.

Photograph by Edward Judice

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BACK

PENDOWN

MEDRES

TURNTO

MOVY

GCLR

COORDS

HIRES

HEADING

MOVXY

MCOLL

SUB

HOME

RPIX

PEN

PLOT

AHEAD

RIGHT

MOVX

YPOS

LOCAL

LEFT

TEXT

XPOS

CALLSUB

PUTCHAR

DATCOLL

PENUP

EXIT

SUBEND

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PENUP is used to stop drawing. After PENUP is executed, drawing commands such as AHEAD, BACK and MOVXY will not draw. RUN Basic's turtle moves to its new location without drawing a line. Sample RUN Basic line:

```
10 PENUP: REM STOP PLOTTING LINE
   HERE
```

PENDOWN. Command format: PENDOWN.

PENDOWN is the Default mode and allows lines to be drawn when RUN Basic's turtle is moved. Sample RUN Basic line:

```
10 PENDOWN : REM RESUME OR BEGIN
   PLOTTING HERE
```

AHEAD. Command format: AHEAD <number of units>.

AHEAD moves the turtle the specified number of pixels ahead. Sample RUN Basic line:

```
10 AHEAD 30.5 : REM MOVE TURTLE 30.5
   PIXELS FORWARD
```

BACK. Command format: BACK <number of units>.

BACK moves the turtle the specified number of pixels backwards. Sample RUN Basic line:

```
10 BACK 162: REM MOVE TURTLE BACK
   162 PIXELS
```

MOVXY. Command format: MOVXY <x-coordinate, y-coordinate>.

MOVXY moves the turtle to the position specified by the x,y coordinates. If the pen is down during the execution of MOVXY, a line will be drawn. Sample RUN Basic line:

```
10 MOVXY 10,39: REM MOVE TURTLE TO
   THE INTERSECTION OF X (10)
   AND Y (39)
```

MOVX. Command format: MOVX <x-coordinate>.

This command moves the turtle to the specified x-coordinate. Sample RUN Basic line:

```
10 MOVX 100: REM MOVE THE TURTLE
   TO THE X-COORDINATE (100)
```

MOVY. Command format: MOVY <y-coordinate>.

This command moves the turtle to the specified y-coordinate. Sample RUN Basic line:

```
10 MOVY 199 : REM MOVE THE TURTLE
   TO THE Y-COORDINATE (199)
```

TURNTO. Command format: TURNTO <angle>.

TURNTO points the turtle in the specified direction. The angle must be in radians, as used in Basic 2.0. A radian is a unit of measure for angles or arcs. To convert degrees to radians, use the following equation:

Radian measure of an angle = number of degrees *π/180

An angle of 0 (radians *or* degrees) points the turtle to the right, on a heading parallel to the x-axis. An angle of π/2 radians, or 90 degrees, points it straight up, parallel to the y-axis. Sample RUN Basic line:

```
10 TURNTO .4 : REM POINTS THE TURTLE
   UP AT AN ANGLE OF 23 DEGREES
   MEASURED COUNTERCLOCKWISE
   FROM THE 0 DEGREE DIRECTION.
```

LEFT. Command format: LEFT <angle>.

LEFT turns the turtle left from its current direction by the specified angle (always in radians). Sample RUN Basic line:

```
10 LEFT .3 : REM TURNS THE TURTLE 17
   DEGREES TO THE LEFT
```

RIGHT. Command format: RIGHT <angle>.

This command turns the imaginary turtle right by the specified angle. Sample RUN Basic line:

```
10 RIGHT π/4: REM TURNS THE TURTLE
   45 DEGREES TO THE RIGHT
```

PUTCHAR. Command format: PUTCHAR <screen-code-value (0–255)>.

The PUTCHAR command draws the specified character at the current turtle position. The character is specified by its screen-code value, not its ASCII value. Check your user's guide for a table of screen codes. Sample RUN Basic line:

```
10 PUTCHAR 1: REM PRINT AN "A" AT
   CURRENT POSITION
```

HOME. Command format: HOME.

HOME moves the turtle to the center of the screen. Sample RUN Basic line:

```
10 HOME : REM MOVE TO CENTER OF
   SCREEN
```

PLOT. Command format: PLOT <plot-type (0–3), x-coordinate (0–319), y-coordinate (0–199)>.

The PLOT command plots one pixel at the specified coordinates using the specified plot-type (see definitions of plot-types under the PEN command, above). The location of RUN Basic's imaginary turtle has no effect on this command. Sample RUN Basic line:

```
10 PLOT 1,100,38 : REM PLOT A VISIBLE
   PIXEL AT X (100), Y (38)
```

XPOS. Command format: XPOS.

XPOS returns the current x-coordinate of the turtle's position. Sample alternative RUN Basic lines:

```
10 A = XPOS : PRINT A: REM PRINTS
   CURRENT X POSITION OF TURTLE
10 PRINT XPOS : REM PRINTS CURRENT
   X POSITION OF TURTLE
```

YPOS. Command format: YPOS.

This command returns the current y-coordinate of the turtle's position. Sample alternative RUN Basic lines:

```
10 A = YPOS : PRINT A: REM PRINTS
   CURRENT Y POSITION OF TURTLE
10 PRINT YPOS : REM PRINTS CURRENT
   Y POSITION OF TURTLE
```

HEADING. Command format: HEADING.

HEADING is used to determine the angle of the direction in which the turtle is currently pointing. Sample RUN Basic lines:

```
10 A = HEADING : PRINT A : REM PRINTS
   CURRENT ANGLE TURTLE IS
   POINTING
10 PRINT HEADING : REM PRINTS
   CURRENT ANGLE TURTLE IS
   POINTING
10 TURNTO HEADING + .1 : REM
   TURN TO CURRENT HEADING PLUS
   .1 RADIAN
```

COORDS. Command format: COORDS (x-coordinate, y-coordinate).

This command returns the direction from the turtle's position to the specified coordinates. Sample RUN Basic lines:

```
10 A = COORDS(0,0) : PRINT A : REM
   PRINTS THE DIRECTION OF THE
   POINT (0,0) FROM THE TURTLE'S
   POSITION
10 PRINT COORDS(31,29) : REM PRINTS
   THE DIRECTION OF POINT (31,29)
   FROM THE TURTLE'S POSITION
10 TURNTO COORDS(150,36): REM TURNS
   TURTLE TOWARDS (150,36)
```

RPIX. Command format: RPIX (x-coordinate, y-coordinate).

RPIX is used to return the plot-type used to draw a pixel. The plot-type returned in Med-res mode will vary from 0 to 3. In Hi-res mode, the plot-type returned will be either 0 or 1. Sample RUN Basic lines:

```
10 A = RPIX(300,150): PRINT A : REM
```

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```
PRINTS THE PLOT-TYPE USED AT
300,150
10 ON RPIX(QT,QS) GOSUB 100,200 : REM
GOSUB WHEN THE ARGUMENT IS
SATISFIED
```

Sprite Commands

DATCOLL. Command format: DATCOLL.

DATCOLL returns the contents of the sprite-background collision register. If a sprite collides with the background, its corresponding bit is set. Bit 0 corresponds to sprite 1, bit 1 corresponds to sprite 2, etc. Sample RUN Basic lines:

```
10 IF DATCOLL AND 128 THEN GOSUB
1000: REM HANDLE SPRITE 8
COLLISION
10 A = DATCOLL : PRINT A : REM PRINTS
SPRITE/BACKGROUND COLLISION
OCCURRED
10 PRINT DATCOLL : REM PRINTS
SPRITE/BACKGROUND COLLISION
OCCURRED
```

MCOLL. Command format: MCOLL.

MCOLL returns the contents of the sprite-sprite collision register. When two sprites collide, their corresponding bits are set. The sprites are then mapped to the register bits in a slight variation of the method explained under DATCOLL. The difference is that the collision of two sprites sets two bits instead of one. Sample RUN Basic lines:

```
10 IF MCOLL = 4 + 2 THEN GOTO 6000 :
REM SPRITES 3 AND 2 HAVE
COLLIDED
10 IF MCOLL = 8 + 16 + 32 THEN GOTO
4000 : REM SPRITES 4, 5 AND 6 HAVE
COLLIDED
10 PRINT MCOLL : REM PRINTS IF
SPRITE/SPRITE COLLISION OCCURS
10 A = MCOLL : REM IDENTIFIES SPRITE/
SPRITE COLLISION OCCURRED
```

Structured Programming

SUB. This is used to declare a named subroutine that can be executed with the CALLSUB command. The subroutine's name must follow the SUB command and may be up to 31 characters long, though only the first four letters are significant.

Unlike variables, Basic commands can be embedded within the name. SUB PRINT-IT(A$) is an acceptable subroutine title. Punctuation and spaces can be used within the name, but graphics characters cannot.

Parentheses that enclose an optional list of variables must follow the name. The optional list of variables contains any values to be passed to the subroutine. This passing of values is

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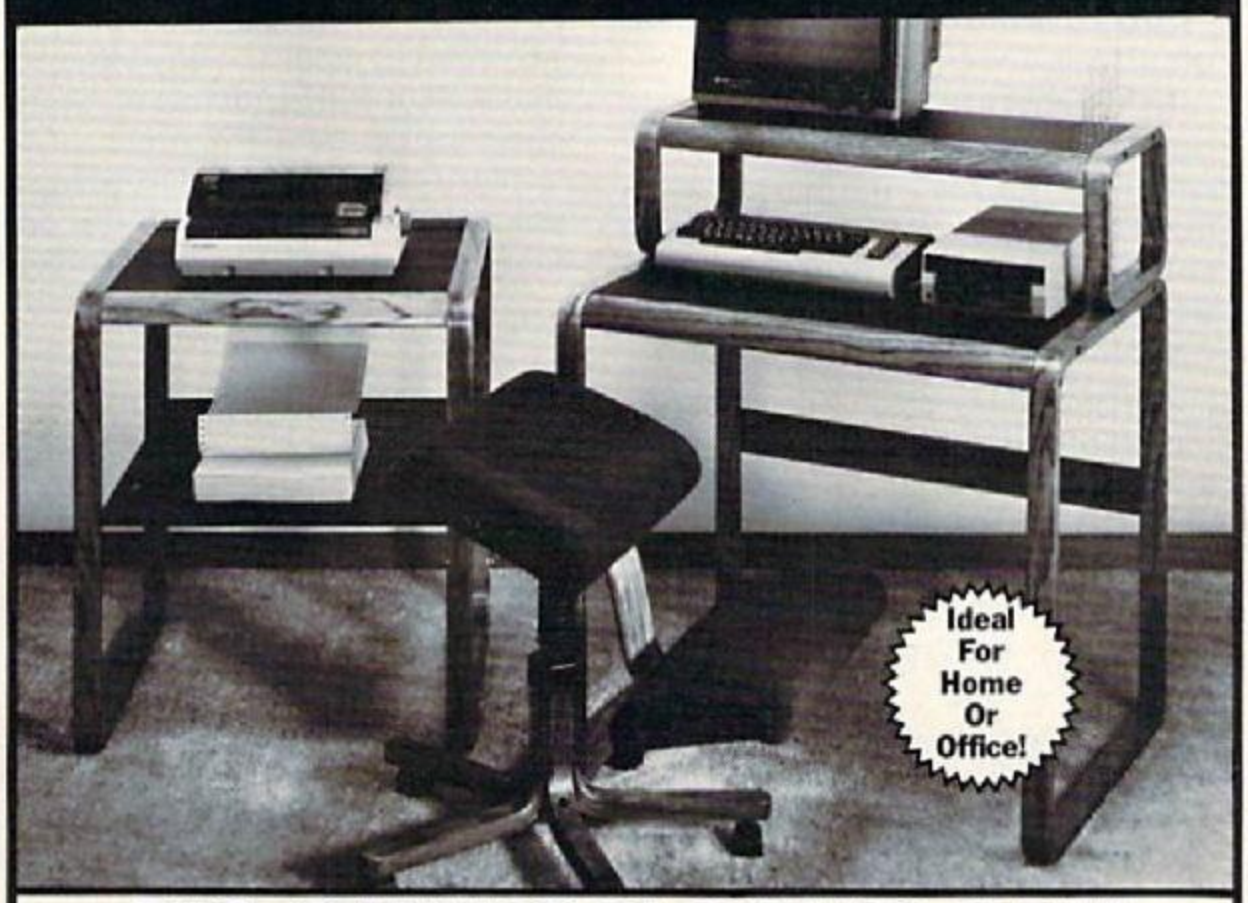

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similar to the Basic 2.0 DEF FN command, except that up to 35 values may be passed to a subroutine; only one value may be passed to a function.

When the SUB command is executed, it scans ahead in the program, looking for the SUBEND command, which will be described next. If SUBEND is not found, a syntax error occurs.

If SUBEND is found, the subroutine is initialized, and program execution is resumed at the line following SUBEND. The code between SUB and SUBEND is executed only when the subroutine is called with the CALLSUB command.

The variables enclosed by parentheses following the subroutine name are local variables, meaning that they are referenced only when the subroutine is executed. After the subroutine finishes executing, all local variables created by the subroutine are no longer accessible.

This allows you to use the same variable name twice—once within the subroutine and once outside the subroutine.

SUBEND. SUBEND is used to mark the end of a subroutine and is equivalent to the RETURN command used in Basic 2.0 subroutines. The guidelines for SUBEND are simple.

First, every SUB must have its corresponding SUBEND. Next, SUBEND must be the first command on its line. Finally, if the SUBEND command is preceded by colons or any other command, SUB will be unable to locate it, and a syntax error will occur.

The following sample program demonstrates the use of the SUB, CALLSUB and SUBEND commands:

```
10 SUB TEST (X,Y,A$)
20 PRINT "LINE 20
   X = "X;"Y = "Y;"A$ = ";A$
30 SUBEND
40 '
50 X = 5: Y = 5: A$ = "GLOBAL"
60 PRINT"LINE 60 X = "X;"Y = "Y;"A$ = ";A$
70 CALLSUB TEST(1,2,"LOCAL")
80 PRINT "LINE 80
   X = "X;"Y = "Y;"A$ = ";A$
```

In line 50, three global (normal) variables, X,Y,A$, have been assigned values. Three local variables with the same names are created by CALLSUB when it calls the subroutine TEST. The local variables are different variables and have different values from the global (normal) variables, but they share the same names!

How does this program execute? The SUB command is executed first, and it scans ahead looking for SUBEND, which it finds on line 30. It then initializes the subroutine TEST. This permits execution to resume on line 40. The code from lines 40 to 80 is executed normally.

The output appears as follows:

```
LINE 60  X = 5 Y = 5 A$ = GLOBAL
LINE 20  X = 1 Y = 2 A$ = LOCAL
LINE 80  X = 5 Y = 5 A$ = GLOBAL
```

This program demonstrates how global variables retain their assigned values, despite the fact that the local variables were assigned different values within the subroutine.

EXIT. This is used to terminate subroutine execution prematurely. It is the equivalent of the RETURN command. Like SUBEND, EXIT works only with named subroutines. See the subroutine C-CURVE in the demo program (Listing 3) for an example.

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Programed by Jim Drew

Program	Star Dos	Reg. Load	Mach 5	Fast Load	MAGNUM LOAD
Pitstop II	?	144 sec.	43 sec.	41 sec.	**31 sec.**
Music Shop	?	105 sec.	105 sec.*	105*	**21 sec.**
Hitchhiker's Guide to the Galaxy	?	70 sec.	70 sec.*	N.G.**	**58 sec.**
On-field Football	?	149 sec.	66 sec.	63 sec.	**56 sec.**
EASY FINANCE I	?	58 sec.	13 sec.	13 sec.	**11 sec.**

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*Will not fast load - defaulted back to regular load

**Failed to load at all

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LOCAL. This is used to create local variables in addition to those CALL-SUB has created and passed values to. LOCAL should only be used within a named subroutine. Sample RUN Basic line:

```
LOCAL A,B,FF%,QQ$
```

Tech Talk

RUN Basic works by using the C-64's RAM in a variety of ways. The RAM under the Basic ROM is used for storage of variables. A graphics bit map uses the RAM under the Kernal ROM. RUN Basic's turtle graphics commands for color memory use the RAM at addresses 49152 to 50176. Free RAM exists from locations 50177 to 53247 for other uses such as sprite storage.

To see a demonstration of RUN Basic's turtle graphics and structured programming commands, type in Listing 3. Be sure to save it before running it. You'll be impressed with the speed of RUN Basic's turtle graphics, compared to other turtle graphics programs.

Typing in RUN Basic

Use the following step-by-step procedure to type in RUN Basic.

First, make sure you have a copy of Basic 4.5 on disk. If you don't already have Basic 4.5, refer to the 1985 ReRUN Productivity Pak or *RUN*'s June, July and August 1985 issues.

Type in the machine language listing of RUN Basic using ML Perfect Typist (see the March 1986 issue of *RUN*, p. 97) and save it on the same disk with the name "Object". Next, type in and save the Patch program (Listing 2).

Next, load and run the Patch program while the disk with Object and Basic 4.5 is in the drive. The Patch program will create RUN Basic by combining Basic 4.5 and the Object program. After the RUN Basic title screen appears, you must save RUN Basic with the following command:

```
BSAVE"RUN Basic 1.0",P$7000 to P$A000
```

Use this new version for your future programming and just set aside Basic 4.5.

To load RUN Basic 1.0 from disk, just execute:

```
LOAD "0:RUN BASIC 1.0",8,1
```

Once the program loads, enter SYS64738 and press the return key to start it.

RUN Basic will also work on cassette. For cassette instructions, send me your request with a self-addressed envelope and 50 cents to cover my Canadian postage costs. R

Address all author correspondence to Robert Rockefeller, R.R. #4, Langton, Ontario, Canada N0E 1G0.

Listing 1. *RUN Basic ML object code.*

```
0001 00 70 48 49 52 45 D3 4D 45 44 52 94 03
0002 45 D3 54 45 58 D4 47 43 4C D2 50 D7 04
0003 45 CE 50 4C 4F D4 44 4F 57 CE 55 E2 04
0004 D0 41 48 45 41 C4 42 41 43 CB 4D 85 04
0005 4F 56 58 D9 4D 4F 56 D9 4D 4F 56 98 04
0006 D8 54 55 52 4E 54 CF 4C 45 46 D4 F5 04
0007 52 49 47 48 D4 50 55 54 43 48 41 CA 03
0008 D2 48 4F 4D C5 53 55 42 45 4E C4 C4 04
0009 53 55 C2 43 41 4C 4C 53 55 C2 45 3E 04
0010 58 49 D4 4C 4F 43 41 CC 4D 45 52 4E 04
0011 47 C5 45 58 45 C3 00 00 00 00 00 BC 02
0012 00 00 00 00 00 00 00 00 00 00 00 0C 00
0013 00 00 00 00 00 00 00 00 00 00 00 0D 00
0014 00 00 00 00 00 00 00 00 00 00 00 0E 00
0015 00 00 00 00 00 00 00 00 00 00 00 0F 00
0016 00 00 00 00 00 00 00 00 00 00 00 10 00
0017 00 00 00 00 00 00 00 00 00 00 00 11 00
0018 00 00 00 00 00 00 00 00 00 00 00 12 00
0019 00 00 00 00 00 00 00 00 00 00 00 13 00
0020 00 00 00 00 00 00 00 00 00 00 00 14 00
0021 00 00 00 00 00 00 00 00 00 00 00 15 00
0022 00 00 00 00 00 00 00 00 00 00 00 16 00
0023 00 00 58 50 4F D3 59 50 4F D3 48 F4 03
0024 45 41 44 49 4E C7 43 4F 4F 52 44 B7 03
0025 D3 52 50 49 D8 44 41 54 43 4F 4C 66 04
0026 CC 4D 43 4F 4C CC 00 00 00 00 00 DD 02
0027 00 00 00 00 00 00 00 00 00 00 00 1B 00
0028 00 00 00 00 00 00 00 00 00 00 00 1C 00
0029 00 00 00 00 00 00 00 00 00 00 00 1D 00
0030 00 00 00 00 00 00 00 00 00 00 00 1E 00
0031 00 00 00 00 00 00 00 00 00 00 00 1F 00
0032 00 00 00 00 00 00 00 00 00 00 00 20 00
0033 00 00 00 00 00 00 00 00 00 00 00 21 00
0034 00 00 00 00 00 00 00 00 00 00 00 22 00
0035 00 00 00 00 00 00 00 00 00 00 00 23 00
0036 00 00 00 00 00 00 00 00 00 00 00 24 00
0037 00 00 00 00 00 00 00 F7 74 39 75 3E 02
0038 76 74 B3 74 49 7A 6A 7A 07 AF 07 9B 04
0039 AF 6B 77 B9 77 4B 78 19 78 E7 77 9A 05
0040 50 79 8E 7A 9B 7A A7 7A D3 7B CA 47 06
0041 7E BB 7C 26 7E CA 7E 26 7F 61 8C 5C 05
0042 D8 8B 00 00 00 00 00 00 00 00 00 8D 01
0043 00 00 00 00 00 00 00 00 00 00 00 2B 00
0044 00 00 00 00 00 00 00 00 00 00 00 2C 00
0045 00 00 00 00 00 00 00 00 00 00 00 2D 00
0046 00 00 00 00 00 00 00 00 00 00 00 2E 00
0047 00 00 00 00 00 00 00 57 7B 60 7B DC 01
0048 69 7B AD 79 A7 7B EB 7B F1 7B 00 2E 06
0049 00 00 00 00 00 00 00 00 00 00 00 31 00
0050 00 00 00 00 00 00 00 00 00 00 00 32 00
0051 00 00 00 00 00 00 00 00 00 00 00 33 00
0052 00 00 00 00 00 00 00 00 00 00 00 34 00
0053 00 00 00 00 00 00 00 00 00 00 00 35 00
0054 00 00 00 00 20 8A AD 20 F7 B7 4C A7 03
0055 58 72 20 8A AD 20 BF B1 A5 65 85 77 05
0056 14 A4 64 84 15 60 00 A6 7A A0 04 11 04
0057 84 0F BD 00 02 10 0A C9 FF D0 03 40 04
0058 4C D6 72 E8 D0 F1 C9 20 F0 F6 85 CB 07
0059 08 C9 22 D0 03 4C 01 73 24 0F 70 64 03
0060 E9 C9 3F D0 04 A9 99 D0 46 C9 30 52 06
0061 90 04 C9 3C 90 3E 20 81 73 C8 E8 68 05
0062 BD 00 02 38 F9 9E A0 F0 F5 C9 80 9A 06
0063 D0 04 05 0B D0 26 A6 7A E6 0B C8 F2 04
0064 B9 9D A0 10 FA B9 9E A0 D0 E0 20 07 07
0065 85 73 C8 E8 BD 00 02 38 F9 09 80 62 05
0066 F0 F5 C9 80 D0 39 05 0B 18 69 4C 56 05
0067 A4 71 E8 C8 99 FB 01 B9 FB 01 D0 22 07
0068 03 4C 77 73 38 E9 3A F0 04 C9 49 DE 04
0069 D0 02 85 0F 38 E9 55 F0 03 4C 68 C8 04
0070 72 85 08 BD 00 02 F0 D9 C5 08 F0 8A 05
0071 D5 C8 99 FB 01 E8 D0 F0 A6 7A E6 27 08
0072 0B C8 B9 08 80 10 FA B9 09 80 D0 78 05
0073 AB 20 85 73 C8 E8 BD 00 02 38 F9 AC 05
0074 F2 70 F0 F5 C9 80 D0 11 A9 DE A4 E6 07
0075 71 C8 99 FB 01 84 71 A5 0B 18 69 3F 05
0076 02 D0 9A A6 7A E6 0B C8 B9 F1 70 AB 06
0077 10 FA B9 F2 70 D0 D3 20 85 73 C8 F5 06
0078 E8 BD 00 02 38 F9 00 70 F0 F5 C9 44 06
0079 80 D0 05 A9 DF 4C 2B 73 A6 7A E6 1C 06
0080 0B C8 B9 FF 6F 10 FA B9 00 70 D0 4D 06
0081 DF BD 00 02 30 03 4C D4 72 99 FD 4A 05
0082 01 C6 7B A9 FF 85 7A 60 86 7A 84 1F 06
0083 71 A0 00 84 0B 88 A6 7A CA 60 84 49 05
```

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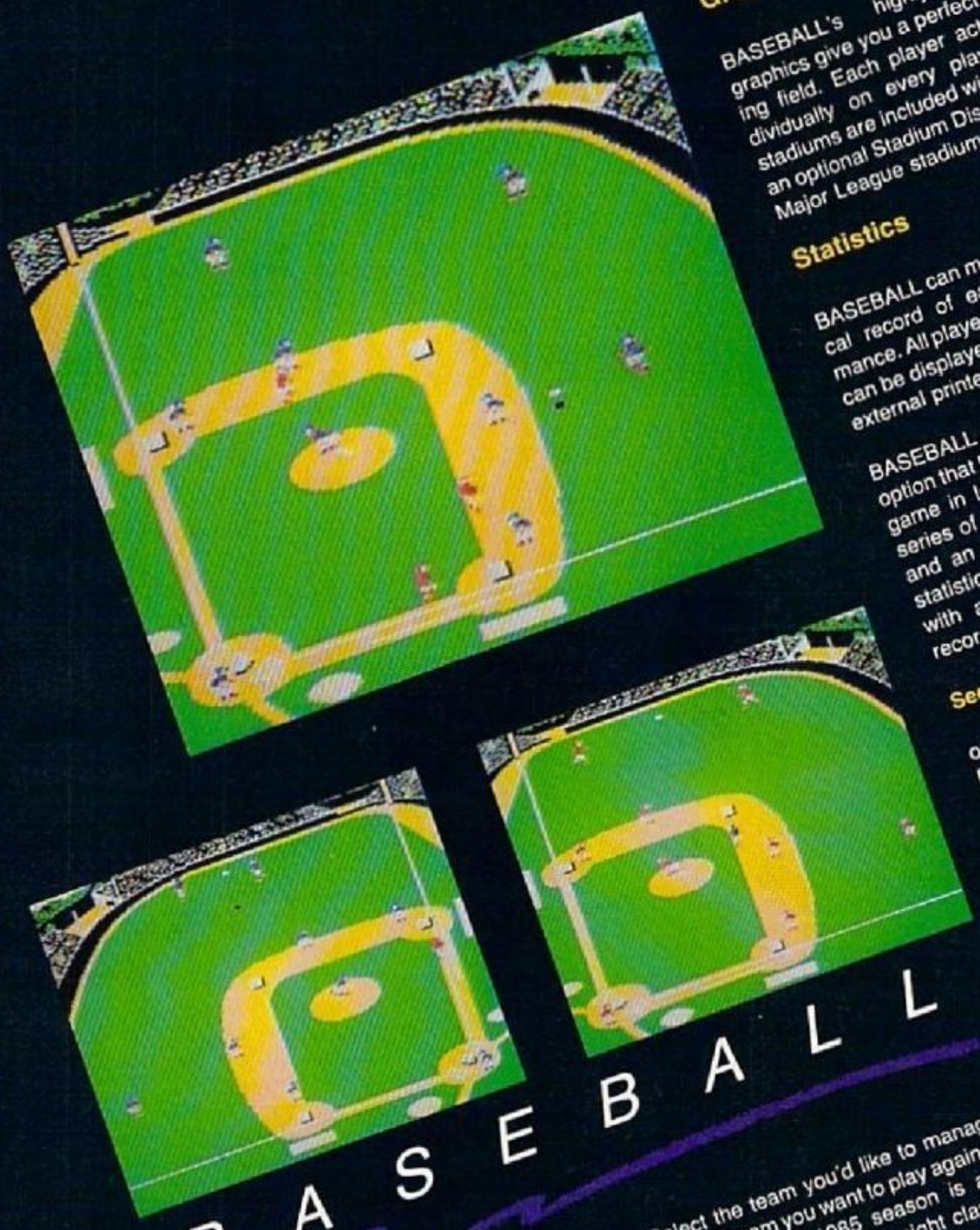

BASEBALL

Graphics

BASEBALL's highly-detailed animated graphics give you a perfect view of the playing field. Each player acts and moves individually on every play. Three different stadiums are included with the program, and an optional Stadium Disk lets you play in any Major League stadium in the United States.

Statistics

BASEBALL can maintain a complete statistical record of each team player's performance. All player stats and game Box Scores can be displayed on the screen or sent to an external printer for a hardcopy printout.

BASEBALL also includes a unique Auto-Play option that lets the computer play a complete game in less than three minutes. A whole series of games can be played unattended, and an entire season of player and team statistics can be compiled over several days with all game stats printed out for your records.

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or write or call for more information. BASEBALL is available on disk for the Commodore 64 and Commodore 128 computers. For direct orders please enclose $49.95 plus $2.00 for shipping and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club cards accepted.

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From the author of FOOTBALL comes an incredibly sophisticated, realistic and complete statistical baseball simulation for one or two players. Game play, manager's functions, graphics, and a statistical library establish BASEBALL as the ultimate sports simulation program.

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BASEBALL's underlying statistical framework simulates the realities of baseball like never before. Within this framework, the program considers each player's batting statistics against both left-handed and right-handed pitchers, and pitchers statistics vs. left- and right-handed batters. Every player's fielding and base-running abilities are also considered (an important factor when attempting to steal a base, etc.).

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Manager's Functions

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Listing 1 continued.

```
0084 49 10 0E C9 FF F0 0A 24 0F 30 06 E6 03
0085 20 A3 73 4C 42 86 4C 3F 86 C9 DE 57 05
0086 F0 37 C9 DF F0 40 C9 CC B0 26 A2 62 07
0087 9E A0 A0 86 35 84 36 29 7F AA A0 9C 05
0088 FF CA 30 07 C8 B1 35 10 FB 30 F6 37 06
0089 C8 B1 35 08 29 7F 20 47 AB 28 10 01 04
0090 F4 A4 49 60 A2 09 A0 80 38 E9 4C D3 05
0091 D0 D5 20 F4 73 A2 F2 A0 70 38 E9 4C 07
0092 02 4C B3 73 20 F4 73 A2 00 A0 70 09 05
0093 D0 F1 C8 E6 49 B1 5F 60 C9 02 90 E0 06
0094 13 C9 1C B0 0F E9 01 0A A8 B9 92 FC 04
0095 71 48 B9 91 71 48 4C 73 00 4C 08 2E 04
0096 AF C9 FF D0 03 4C 9E AE C9 DE F0 D9 07
0097 03 4C AD AE 20 73 00 C9 02 90 13 0C 04
0098 C9 09 B0 0F E9 01 0A A8 B9 00 72 BA 04
0099 48 B9 FF 71 48 4C 73 00 4C 08 AF DE 04
0100 00 00 00 00 00 00 00 00 00 00 00 64 00
0101 00 00 00 00 00 00 00 00 00 00 00 65 00
0102 00 00 00 00 00 00 00 00 00 00 00 66 00
0103 00 00 00 00 00 00 00 00 00 00 00 67 00
0104 00 00 00 00 00 00 00 00 00 00 00 68 00
0105 D0 A9 04 8D 88 02 A9 1B 8D 11 D0 2F 05
0106 A9 17 8D 18 D0 AD 00 DD 09 03 8D C2 04
0107 00 DD A9 C8 8D 16 D0 A9 FF 8D 41 A2 06
0108 74 60 86 22 84 23 A0 00 CC 47 74 B6 04
0109 D0 06 CE 48 74 10 01 60 91 22 C8 B9 04
0110 D0 F0 E6 23 4C 9F 74 A9 40 8D 47 53 06
0111 74 A9 1F 8D 48 74 A9 00 AA A0 E0 C7 05
0112 20 99 74 A9 E8 8D 47 74 A9 03 8D AF 05
0113 48 74 AD 45 74 A2 00 A0 D8 20 99 66 05
0114 74 A9 E8 8D 47 74 A9 03 8D 48 74 B4 05
0115 AD 43 74 0D 44 74 A2 00 A0 C0 20 BE 04
0116 99 74 AD 42 74 8D 21 D0 60 20 9E 80 05
0117 B7 8E 44 74 20 FD AE 20 9E B7 8A 3C 06
0118 0A 0A 0A 0A 8D 43 74 AD 21 D0 8D 0D 04
0119 42 74 AD 86 02 8D 45 74 A9 08 8D E6 04
0120 18 D0 A9 3B 8D 11 D0 AD 00 DD 29 65 05
0121 FC 8D 00 DD A9 00 8D 40 74 A9 FF 71 06
0122 8D 41 74 A9 C8 8D 16 D0 60 20 9E BE 05
0123 B7 8E 21 D0 8E 42 74 20 FD AE 20 E0 05
0124 9E B7 8A 0A 0A 0A 0A 8D 43 74 20 E7 03
0125 FD AE 20 9E B7 8E 44 74 20 FD AE AE 06
0126 20 9E B7 8E 45 74 20 18 75 A9 D8 68 05
0127 8D 16 D0 A9 FF 8D 40 74 60 00 E0 1B 06
0128 40 E1 80 E2 C0 E3 00 E5 40 E6 80 31 07
0129 E7 C0 E8 00 EA 40 EB 80 EC C0 ED 3E 08
0130 00 EF 40 F0 80 F1 C0 F2 00 F4 40 F8 06
0131 F5 80 F6 C0 F7 00 F9 40 FA 80 FB 53 08
0132 C0 FC 00 FE 00 C0 28 C0 50 C0 78 6E 06
0133 C0 A0 C0 C8 C0 F0 C0 18 C1 40 C1 B7 07
0134 68 C1 90 C1 B8 C1 E0 C1 08 C2 30 14 07
0135 C2 58 C2 80 C2 A8 C2 D0 C2 F8 C2 5B 08
0136 20 C3 48 C3 70 C3 98 C3 C0 C3 80 07 07
0137 40 20 10 08 04 02 01 C0 C0 30 30 E8 02
0138 0C 0C 03 03 00 55 AA FF A9 C7 38 4E 04
0139 ED 61 74 8D 61 74 AD 5F 74 29 07 5F 05
0140 8D 4E 74 AD 60 74 48 AD 5F 74 29 4D 05
0141 F8 8D 5F 74 AD 61 74 4A 4A 29 FE 22 06
0142 A8 AD 61 74 29 07 18 79 71 75 6D CC 04
0143 5F 74 90 04 EE 60 74 18 85 BB B9 C9 05
0144 72 75 6D 60 74 85 BC 68 6A AD 5F D7 05
0145 74 6A 4A 4A 18 79 A3 75 85 AE B9 98 05
0146 A4 75 69 00 85 AF 60 AD 62 74 F0 1B 06
0147 01 60 AD 61 74 C9 C8 B0 F8 AD 60 BC 06
0148 74 29 FE D0 F1 AD 60 74 F0 07 AD 15 07
0149 5F 74 29 C0 D0 E5 20 E9 75 AE 4E 80 06
0150 74 AD 46 74 29 03 A8 AD 40 74 D0 76 05
0151 0C 98 F0 03 BD D5 75 8D 4E 74 4C D0 05
0152 89 76 B9 E5 75 3D DD 75 8D 4E 74 88 06
0153 BD DD 75 49 FF A0 00 48 78 A9 35 2E 06
0154 85 01 68 31 BB 0D 4E 74 91 BB A9 38 05
0155 37 85 01 58 AD 43 74 0D 44 74 91 6A 04
0156 AE AD 40 74 F0 0D A5 AF 29 03 09 31 05
0157 D8 85 AF AD 45 74 91 AE 60 AD 41 9C 06
0158 74 D0 01 60 AD 47 74 D0 05 CE 48 96 05
0159 74 30 F5 CE 47 74 AD 4F 74 18 6D B6 05
0160 57 74 8D 57 74 AD 50 74 6D 58 74 6D 05
0161 8D 58 74 AD 51 74 6D 59 74 8D 5F 92 05
0162 74 8D 59 74 AD 52 74 6D 5A 74 8D AB 05
0163 60 74 8D 5A 74 AD 53 74 18 6D 5B 26 05
0164 74 8D 5B 74 AD 54 74 6D 5C 74 8D B3 05
0165 5C 74 AD 55 74 6D 5D 74 8D 61 74 8B 05
0166 8D 5D 74 AD 56 74 6D 5E 74 8D 62 A9 05
0167 74 8D 5E 74 AD 3F 74 F0 03 20 40 2D 05
0168 76 4C C1 76 A9 00 A8 38 ED 4F 74 DA 05
0169 8D 4F 74 98 ED 50 74 8D 50 74 98 2B 06
0170 ED 51 74 8D 51 74 98 ED 52 74 8D 86 06
0171 52 74 98 38 ED 53 74 8D 53 74 98 E1 05
0172 ED 54 74 8D 54 74 98 ED 55 74 8D 91 06
0173 55 74 98 ED 56 74 8D 56 74 60 20 9C 05
0174 52 72 A5 14 8D 47 74 A5 15 8D 48 02 05
0175 74 10 0F 20 A3 77 20 2F 77 20 BB 1D 04
0176 76 20 2F 77 4C 8D 77 20 BB 76 AD 3A 05
0177 49 74 F0 10 A0 07 B9 67 74 99 4F 91 05
0178 74 88 10 F7 A9 00 8D 49 74 60 AD B5 05
0179 48 74 10 11 38 A9 00 ED 47 74 8D A6 04
0180 47 74 A9 00 ED 48 74 8D 48 74 60 6A 05
0181 20 8A AD A5 66 49 FF 85 66 20 55 BF 05
0182 72 4C 6F 77 A0 07 B9 4F 74 99 67 7D 05
0183 74 88 10 F7 A0 03 A9 00 60 A9 80 8F 05
0184 8D 57 74 8D 58 74 8D 5B 74 8D 5C AE 05
0185 74 60 20 52 72 20 C9 77 99 53 74 31 05
0186 88 10 FA 8D 4F 74 8D 50 74 8D 52 CC 05
0187 74 A9 01 8D 51 74 8D 49 74 38 A5 52 05
0188 14 ED 59 74 85 14 A5 15 ED 5A 74 98 05
0189 85 15 20 D9 77 4C 6F 77 20 52 72 DD 04
0190 20 C9 77 99 4F 74 88 10 FA 8D 53 EC 05
0191 74 8D 54 74 8D 56 74 A9 01 8D 55 6B 05
0192 74 8D 49 74 38 A5 14 ED 5D 74 85 B2 05
0193 14 A5 15 ED 5E 74 85 15 20 D9 77 58 05
0194 4C 6F 77 20 52 72 20 FD AE 38 A5 80 05
0195 14 8D 5F 74 ED 59 74 8D 6F 74 8D EE 05
0196 63 74 A5 15 8D 60 74 ED 5A 74 8D FE 05
0197 70 74 8D 64 74 0D 63 74 D0 03 4C 11 05
0198 1A 78 AD 64 74 10 11 A9 00 38 ED CC 04
0199 63 74 8D 63 74 A9 00 ED 64 74 8D FD 05
0200 64 74 20 52 72 38 A5 14 ED 5D 74 33 05
0201 8D 71 74 8D 65 74 A5 15 ED 5E 74 1A 06
0202 8D 72 74 8D 66 74 0D 65 74 D0 0D 67 05
0203 AD 5F 74 85 14 AD 60 74 85 15 4C 4B 05
0204 EB 77 AD 66 74 10 11 A9 00 38 ED A4 05
0205 65 74 8D 65 74 A9 00 ED 66 74 8D 09 06
0206 66 74 38 A0 00 AD 63 74 ED 65 74 CA 05
0207 AD 64 74 ED 66 74 B0 02 A0 02 8C FB 05
0208 73 74 20 C9 77 A0 00 20 07 79 A0 F7 04
0209 02 20 07 79 A9 01 8D 49 74 AC 73 86 04
0210 74 B9 63 74 85 14 B9 64 74 85 15 9A 05
0211 4C 6F 77 8C 74 74 AE 74 74 BD 6F 3B 06
0212 74 A8 BD 70 74 20 91 B3 20 0C BC DD 05
0213 AE 73 74 BD 63 74 A8 BD 64 74 20 5B 06
0214 91 B3 A5 66 45 6E 85 6F A5 61 20 F2 05
0215 12 BB 20 49 79 20 9B BC AD 74 74 92 05
0216 0A A8 A2 04 B5 61 99 4F 74 C8 CA 34 06
0217 D0 F7 60 A5 61 18 69 10 85 61 60 DD 05
0218 20 8A AD A2 4A A0 74 20 D4 BB A2 82 06
0219 19 A0 00 20 D4 BB 20 64 E2 20 7E 47 05
0220 79 20 84 79 A9 19 A0 00 20 A2 BB 51 05
0221 20 6B E2 20 7E 79 20 87 79 4C D9 A6 05
0222 77 20 49 79 4C 9B BC A0 00 2C A0 46 05
0223 04 A2 04 B5 61 99 4F 74 C8 CA D0 5D 06
0224 F7 60 A2 00 A0 02 2C A0 06 A5 14 06 05
0225 38 F9 57 74 9D 6F 74 A5 15 F9 58 68 06
0226 74 9D 70 74 60 20 FA AE 20 52 72 E3 05
0227 20 95 79 20 FD AE 20 52 72 20 F7 D7 05
0228 AE A2 02 20 9A 79 AD 6F 74 0D 70 76 05
0229 74 D0 18 AD 72 74 30 05 0D 71 74 FB 04
0230 D0 07 A9 33 A0 7A 4C A2 BB A9 38 3D 06
0231 A0 7A 4C A2 BB AD 71 74 0D 72 74 2F 06
0232 D0 16 AD 70 74 30 05 0D 6F 74 D0 54 05
0233 07 A9 A8 A0 AE 4C A2 BB A9 00 85 66 06
0234 61 60 AD 72 74 AC 71 74 20 91 B3 33 06
```

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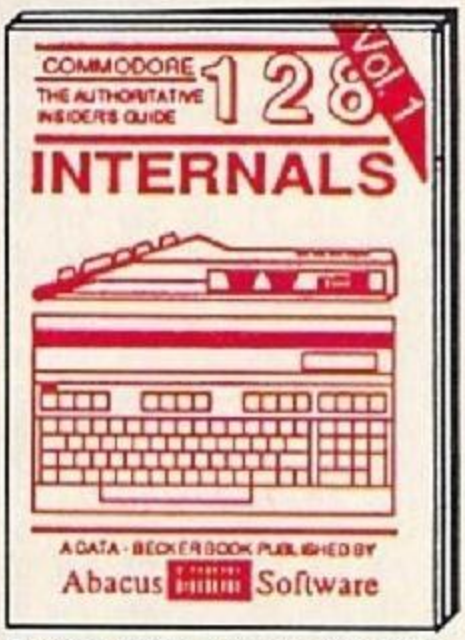

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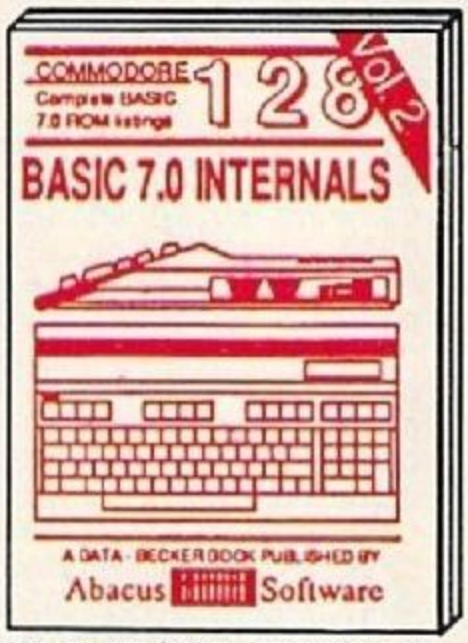

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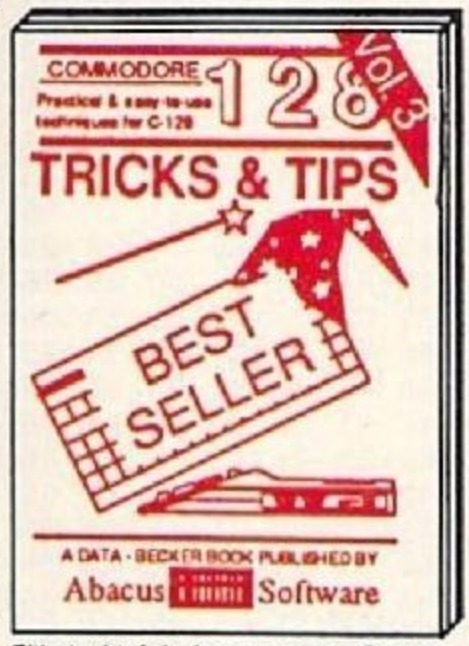

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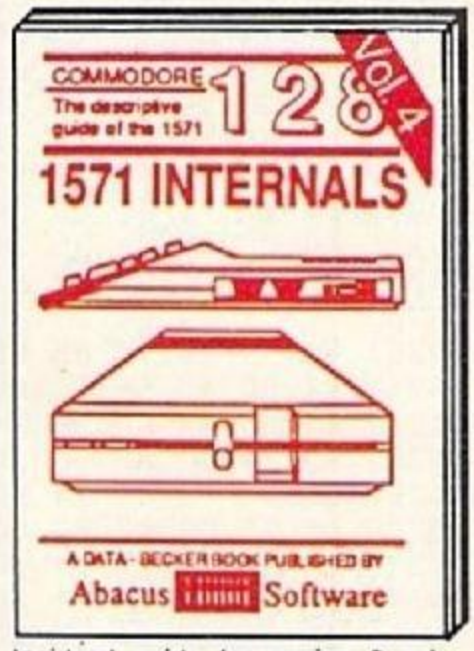

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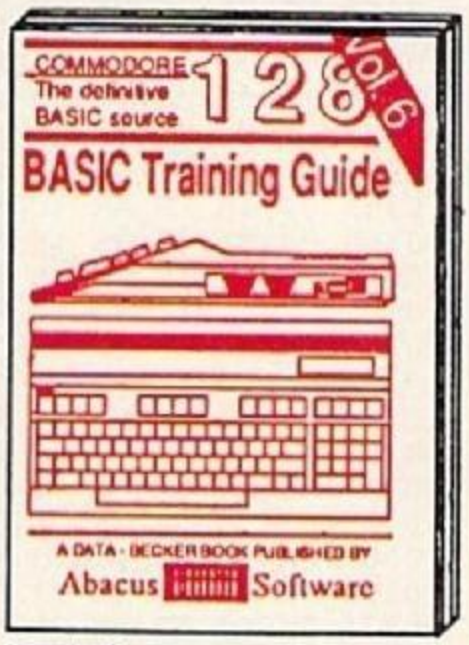

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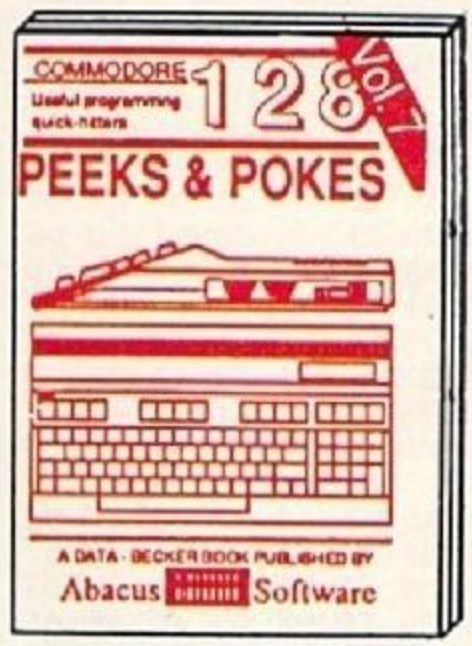

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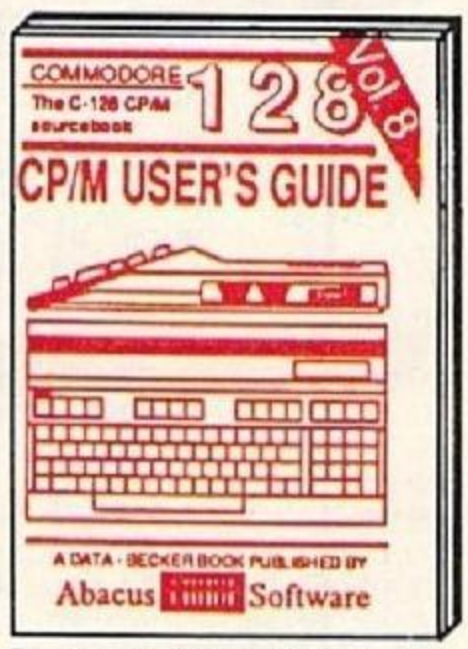

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Listing 1 continued.

```
0235 20 0C BC AD 70 74 AC 6F 74 20 91 A4 05
0236 B3 A5 6E 45 66 85 6F A5 61 20 12 89 05
0237 BB 20 01 E3 AD 70 74 10 07 A9 A8 A5 05
0238 A0 AE 20 67 B8 60 81 C9 0F DA A1 AF 06
0239 81 49 0F DA A1 A9 00 85 70 85 66 CC 05
0240 85 64 85 65 85 0D 60 C9 DF D0 0B 38 06
0241 20 73 00 C9 09 F0 0B C9 08 F0 0A 1C 05
0242 20 9E B7 8E 46 74 60 A9 00 2C A9 8D 05
0243 FF 8D 3F 74 4C 73 00 20 9E B7 8A F0 05
0244 29 03 8D 46 74 20 FD AE 20 52 72 16 05
0245 8D 5F 74 8C 60 74 20 FD AE 20 52 F2 05
0246 72 8D 61 74 8C 62 74 4C 40 76 20 4E 05
0247 8A AD A9 4A A0 74 20 67 B8 4C 54 14 06
0248 79 20 8A AD A9 FF 45 66 85 66 4C 52 06
0249 92 7A 20 9E B7 86 22 AD 3F 74 48 CA 05
0250 AD 46 74 48 A9 00 85 23 A0 03 06 A3 04
0251 22 26 23 88 D0 F9 AD 75 74 18 65 CA 05
0252 22 85 22 AD 76 74 65 23 85 23 78 04 05
0253 A9 33 85 01 B1 22 99 68 00 C8 C0 BB 05
0254 08 90 F6 A9 37 85 01 58 AD 5D 74 C8 05
0255 85 64 AD 5E 74 85 65 AD 59 74 85 50 06
0256 62 AD 5A 74 85 63 AD 40 74 48 A9 17 06
0257 00 8D 40 74 85 25 88 84 24 A6 25 E7 04
0258 16 68 A9 00 90 02 A9 01 8D 46 74 AC 04
0259 A0 03 B9 62 00 99 5F 74 88 10 F7 BC 05
0260 20 40 76 E6 62 D0 02 E6 63 C6 24 27 06
0261 10 DB A9 07 85 24 A5 62 38 E9 08 79 05
0262 85 62 B0 02 C6 63 A5 64 D0 02 C6 69 06
0263 65 C6 64 E6 25 A5 25 C9 08 90 BC 88 06
0264 68 8D 40 74 68 8D 46 74 68 8D 3F 94 05
0265 74 60 AC 59 74 AD 5A 74 4C 91 B3 61 06
0266 AC 5D 74 AD 5E 74 4C 91 B3 A9 4A 89 06
0267 A0 74 4C A2 BB 20 E9 75 78 A9 35 9C 06
0268 85 01 AE 4E 74 AD 40 74 D0 05 BD F5 05
0269 D5 75 D0 03 BD DD 75 A0 00 31 BB C5 06
0270 AA A9 37 85 01 58 AD 40 74 D0 06 AD 05
0271 8A F0 02 A9 01 60 8A C9 04 90 FA 76 06
0272 4A 4A 4C 9F 7B 20 B1 7B 20 71 7B 62 05
0273 4C 3C BC 20 FA AE 20 52 72 8D 5F ED 05
0274 74 8C 60 74 20 FD AE 20 52 72 8D 22 06
0275 61 74 8C 62 74 4C F7 AE 31 36 30 D2 05
0276 2C 31 30 30 00 A5 7A 48 A5 7B 48 A0 04
0277 A9 CC 85 7A A9 7B 85 7B 20 4C 78 91 06
0278 68 85 7B 68 85 7A 60 AD 1F D0 4C 2D 06
0279 3C BC AD 1E D0 4C 3C BC DF 00 00 CD 05
0280 00 00 40 00 00 00 00 00 A9 DF 20 00 03
0281 17 7C E6 7A D0 02 E6 7B A0 00 B1 90 06
0282 7A C9 14 D0 ED 60 85 C3 20 09 A9 A8 06
0283 2C A0 FF C8 B1 7A AA C8 11 7A D0 A6 07
0284 03 4C 08 AF B1 7A 48 C8 C8 C8 B1 9E 06
0285 7A C5 C3 D0 0C 68 98 18 65 7A 85 77 06
0286 7A 90 02 E6 7B 60 8A 85 7A 68 85 61 06
0287 7B D0 D2 A5 2D A6 2E 86 60 85 5F AC 06
0288 E4 30 D0 05 C5 2F 90 01 60 A0 00 8E 05
0289 B1 5F D0 0E C8 C0 05 F0 13 B1 5F AF 06
0290 D9 F7 7B D0 02 F0 F2 A5 5F 18 69 A6 07
0291 07 90 DA E8 D0 D5 A5 5F 18 69 05 AB 06
0292 85 47 90 01 E8 86 48 18 60 C9 28 A0 05
0293 F0 1E 8D F8 7B A9 00 8D F9 7B 8D 6A 07
0294 FA 7B 8D FB 7B A8 C8 B1 7A C9 28 2A 08
0295 F0 14 C9 02 90 04 C0 1F 90 03 4C 48 05
0296 08 AF C0 04 B0 EA 99 F8 7B 90 E5 BE 07
0297 20 FB A8 4C 73 00 20 88 7C 20 4B 3A 05
0298 7C 90 E6 A9 00 85 45 A9 01 85 46 04 06
0299 20 43 B1 A0 01 B9 F7 7B 91 5F C8 C3 06
0300 C0 05 90 F6 A5 7A 91 5F C8 A5 7B 6E 07
0301 91 5F 20 03 7C 20 73 00 4C 3B A9 7F 04
0302 A2 00 86 0C 20 79 00 85 45 20 13 F8 03
0303 B1 B0 03 4C 08 AF A2 00 86 0E 86 52 05
0304 0D 20 73 00 90 05 20 13 B1 90 0B E4 03
0305 AA 20 73 00 90 FB 20 13 B1 B0 F6 83 06
0306 C9 24 D0 06 A9 FF 85 0D D0 10 C9 D8 06
0307 25 D0 13 A5 10 D0 D0 A9 80 85 0E 4C 06
0308 05 45 85 45 8A 09 80 AA 20 73 00 98 04
0309 86 46 60 AD FD 7B C9 40 D0 03 AD 0F 07
0310 FC 7B 60 20 ED 7C 38 05 10 E9 28 F4 05
0311 D0 03 4C D1 B1 20 3D 7D D0 0F 68 F9 05
0312 48 C9 A0 F0 06 A9 96 48 A9 2A 48 81 06
0313 4C E7 B0 20 C4 7D A0 00 84 10 AD 5E 06
0314 FC 7B 85 5F AD FD 7B 85 60 B1 5F AF 07
0315 85 97 A5 5F 38 E5 97 B0 02 C6 60 E7 06
0316 A6 60 86 60 85 5F EC FD 7B D0 0B 4B 07
0317 CD FC 7B D0 06 20 C7 7D 4C E7 B0 9E 07
0318 A5 45 D1 5F D0 08 A5 46 C8 D1 5F 13 07
0319 F0 0B 88 18 A5 5F 69 07 90 D9 E8 9F 06
0320 D0 D4 A5 5F 18 69 02 A4 60 90 01 00 06
0321 C8 84 48 85 47 60 A9 37 2C A9 37 ED 05
0322 85 01 60 EE D5 7D D0 03 EE D6 7D 7C 07
0323 AD 00 A0 C9 3A B0 0A C9 20 F0 ED 13 07
0324 38 E9 30 38 E9 D0 60 AD D5 7D 85 6A 07
0325 7A AD D6 7D 85 7B 60 AD FC 7B 85 C8 07
0326 C1 AD FD 7B 85 C2 A0 00 60 20 ED 80 07
0327 7C E6 BB A5 BB C9 23 90 05 A2 0F F6 06
0328 4C 37 A4 A4 BE C8 A5 45 91 C1 C8 9D 07
0329 A5 46 91 C1 A9 00 A2 05 C8 91 C1 F0 06
0330 CA D0 FA 84 BE 60 20 88 7C 20 4B 0F 07
0331 7C 90 05 A2 11 4C 37 A4 20 F1 7D C4 05
0332 84 BB B1 47 8D D5 7D C8 B1 47 8D AF 07
0333 D6 7D A5 7A 91 C1 C8 A5 7B 91 C1 4B 08
0334 C8 A5 39 91 C1 C8 A5 3A 91 C1 84 C3 07
0335 BE 20 79 00 C9 29 D0 1E 20 D4 7D F7 05
0336 C9 29 F0 03 4C 08 AF 20 73 00 D0 9B 05
0337 F8 A4 BE 98 38 E9 04 20 6B 7F 20 92 06
0338 E6 7D 4C 3B A9 20 88 7F 20 E6 7D 8F 06
0339 20 FE 7D A5 7A 8D D5 7D A5 7B 8D 99 07
0340 D6 7D 20 93 7F A5 BE 38 E9 04 18 79 06
0341 65 C1 85 49 A5 C2 69 00 85 4A 20 08 06
0342 B1 A9 20 79 00 C9 29 D0 03 4C 60 BA 05
0343 7E C9 2C F0 03 4C 67 7E 20 D4 7D 5F 06
0344 C9 2C F0 03 4C 67 7E 20 73 00 20 24 05
0345 CC 7D 4C 7E 7E 20 3D 7D F0 65 20 39 06
0346 F1 7D AD FC 7B 38 F1 C1 B0 04 CE 58 08
0347 FD 7B 38 E9 05 8D FC 7B B0 03 CE 7E 07
0348 FD 7B 20 F1 7D C8 B1 C1 85 7A C8 63 08
0349 B1 C1 85 7B C8 B1 C1 85 39 C8 B1 40 08
0350 C1 85 3A 4C F8 A8 20 48 7D C0 40 AF 06
0351 90 03 4C 2B AF 20 C4 7D A0 04 B1 CE 05
0352 47 99 FE 7B 88 10 F8 20 C7 7D A9 56 07
0353 FE 85 47 A0 7B 84 48 D0 E3 F0 0C C1 07
0354 AD FD 7B C9 40 D0 08 AD FC 7B D0 5C 08
0355 03 4C 08 AF AD FC 7B D0 03 CE FD 2B 07
0356 7B CE FC 7B 20 F1 7D 84 BE C8 A2 5E 08
0357 00 B1 C1 85 97 F0 06 38 E8 E9 07 F9 06
0358 D0 FB 86 BB 20 FE 7D 20 79 00 F0 96 07
0359 06 20 FD AE 4C 59 7F 98 18 65 97 08 06
0360 C8 91 C1 98 18 6D FC 7B 8D FC 7B 1A 08
0361 90 03 EE FD 7B AD FD 7B C9 5F 90 3F 08
0362 03 4C 35 A4 60 00 00 A5 7A 8D 86 24 05
0363 7F A5 7B 8D 87 7F 60 AD 86 7F 85 34 07
0364 7A AD 87 7F 85 7B 60 20 48 7D 4C 2A 06
0365 A8 A9 A9 00 8D 00 40 8D FC 7B A9 E1 06
0366 40 8D FD 7B 60 20 A4 7F 4C E5 81 08 07
0367 20 A4 7F 4C 7C 83 20 A4 7F 4C 69 F5 05
0368 82 20 A4 7F 20 73 00 4C 71 A8 C9 F6 05
0369 0A F0 F3 4C F3 A7 7D 17 52 45 41 B0 06
0370 54 4C 4F 43 F1 7D 67 41 4B 4C 53 A4 05
0371 50 54 52 E6 7D 7F 42 50 54 4F 42 C2 05
0372 41 53 D5 7D 7E 42 41 53 50 54 52 A4 05
0373 E5 7D 7C 50 52 54 49 04
```

Listing 2. *Basic Patch program.*

```
1Ø REM RUN BASIC PATCH PROGRAM          :REM*64
21 REM LOWER TOP OF MEMORY              :REM*29
22 POKE 52,7*16: POKE 56, 7*16         :REM*214
24 IF A=Ø THEN A=1: LOAD"Ø:OBJECT",8,1
                                        :REM*72
25 IF A=1 THEN A=2: LOAD"Ø:BASIC 4.5",8,1
                                        :REM*69
```

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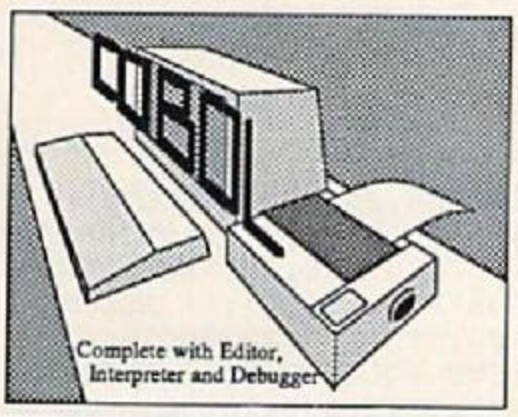

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Listing 2 continued.

```
3Ø NAM$="{2 SPACEs}{SHFT R}{SHFT U}{SHFT N}
   {SHFT B}{SHFT A}{SHFT S}{SHFT I}{SHFT C
   } 1.Ø{2 SPACEs}"                    :REM*38
4Ø REM PATCH NAME                      :REM*17Ø
5Ø FOR A=1 TO LEN(NAM$)                :REM*6Ø
6Ø POKE 33192+A,ASC(MID$(NAM$,A,1)):NEXT
                                       :REM*6
9Ø REM PATCH COPYRIGHT MESSAGE         :REM*8Ø
1ØØ POKE 3323Ø,ASC("6")                :REM*24
12Ø REM PATCH TOP OF MEMORY POINTER    :REM*32
13Ø POKE 33278,112                     :REM*194
15Ø REM PATCH MERGE, EXEC EXECUTION ADRESSE
   S                                   :REM*94
16Ø POKE 33Ø67,7: POKE 33Ø68,175       :REM*94
17Ø POKE 33Ø69,249: POKE 33Ø7Ø,115     :REM*116
19Ø REM PATCH IN NEW ERROR ROUTINE     :REM*142
2ØØ POKE 33167,184: POKE 33168,127     :REM*88
21Ø REM PATCH NEW TOKENIZE ROUTINE     :REM*17Ø
22Ø POKE 33171,98: POKE 33172,114      :REM*152
23Ø REM PATCH NEW LIST TOKENS ROUTINE
                                       :REM*196
24Ø POKE 33173,142: POKE 33174,115     :REM*24Ø
26Ø REM PATCH COLD AND NMI VECTORS     :REM*25
27Ø POKE 32768,178: POKE 32769,127     :REM*117
28Ø POKE 3277Ø,19Ø: POKE 32771,127     :REM*1Ø1
3ØØ REM POKE DUMMY RETURN FOR EVALVAR
                                       :REM*83
31Ø POKE 38443,96                      :REM*87
33Ø REM PATCH EVALUATE ELEMENT ROUTINE
                                       :REM*11
34Ø REM TO ALLOW LOCAL VARIABLES       :REM*145
35Ø POKE 34277,3: POKE 34278,127       :REM*189
36Ø POKE 34133,2Ø: POKE 34134,116      :REM*137
37Ø POKE 341Ø5,158: POKE 341Ø6,127     :REM*15
39Ø REM PATCH IN NEW RUN COMMAND       :REM*211
4ØØ POKE 34Ø57,2Ø5: POKE 34Ø58,127     :REM*55
42Ø REM PATCH BUGS IN BASIC 4.5        :REM*71
43Ø POKE 34349,4                       :REM*143
44Ø POKE 33137,71: POKE 33138,254      :REM*167
46Ø SYS 64738: REM START RUN BASIC     :REM*41
```

Listing 3. *Demo program 1; the binary tree.*

```
200 ' DEMO ONE FOR RUN BASIC 1.0
210 PI=3.14159265
250 ' THE BINARY TREE
260 ' THESE 3 SUBENDROUTINES DRAW A TREE
270 '
280 SUB LEFT-BRANCH(SIZE,ANGLE,LEVEL)
290 AHEAD 2*SIZE
300 CALLSUB NODE(SIZE,ANGLE,LEVEL)
310 BACK 2*SIZE
320 SUBEND
330 '
340 SUB RIGHT-BRANCH(SIZE,ANGLE,LEVEL)
350 AHEAD SIZE
360 CALLSUB NODE(SIZE,ANGLE,LEVEL)
370 BACK SIZE
380 SUBEND
390 '
400 SUB NODE(SIZE,ANGLE,LEVEL)
410 IF LEVEL=0 THEN EXIT
420 LEFT ANGLE
430 CALLSUBLEFT-BRANCH(SIZE,ANGLE,LEVEL-1)
440 RIGHT 2*ANGLE
450 CALLSUBRIGHT-BRANCH(SIZE,ANGLE,LEVEL-1)
460 LEFT ANGLE
470 SUBEND
500 ' THIS SUBENDROUTINE PRINTS STRINGS
510 ' TO THE SPECIFIED SCREEN COORDINATES.
515 ' PLEASE NOTE: WHEN USING RUN BASIC,
520 ' TRY USING THIS SUBENDROUTINE.
530 ' RETAINS TURTLE YPOS, HEADING
540 SUB PUTSTR(X,Y,CHAR$)
541 LOCAL XSAV,YSAV,HSAV,C
542 XSAV=XPOS: YSAV=YPOS: HSAV=HEADING
550 PENUP: MOVXY X,Y: TURNTO 0
570 FOR A=1 TO LEN(CHAR$)
580 C=ASC(MID$(CHAR$,A,1))
590 ' CONVERT TO SCREEN CODE VALUE
600 IF C<64 THEN 640
610 IF C<96 THEN C=CAND31: GOTO 640
620 IF C<192 THEN C=(CAND63)OR96:GOTO 640
630 C=CAND95
640 PUTCHAR C: AHEAD 8
650 NEXT A
655 MOVXY XSAV,YSAV:TURNTO HSAV:'POSITION
660 SUBEND
700 ' DRAW TREE BY CALLING EITHER
710 ' RIGHT-BRANCH OR LEFT-BRANCH
720 HIRES 0,1: GCLR
730 ' LABEL TREE
740 CALLSUB PUTSTR(100,180,"BINARY TREE")
750 MOVXY 160,20
760 TURNTO PI/2: PEN 1: PENDOWN
770 CALLSUB LEFT-BRANCH(10,PI/9,7)
800 '
810 SUB C-CURVE(SIZE,LEVEL)
820 IF LEVEL=0 THEN AHEAD SIZE: EXIT
830 CALLSUB C-CURVE(SIZE,LEVEL-1)
840 RIGHT PI/2
850 CALLSUB C-CURVE(SIZE,LEVEL-1)
860 LEFT PI/2
870 SUBEND
880 '
890 GCLR:CALLSUB PUTSTR(210,100,"C CURVE")
900 '
910 MOVXY 160,50: TURNTO PI: PENDOWN
920 CALLSUB C-CURVE(3,10)
960 ' THIS SUBENDROUTINE DRAWS POLYGONS
970 ' SUCH AS SQUARES, TRIANGLES,
980 ' OR OCTAGONS. POLYGONS WITH MANY
990 ' SIDES APPEAR AS CIRCLES.
1000 SUB POLY(SIZE,NUM)
1010 FOR A=1 TO NUM
1020 AHEAD SIZE
1030 RIGHT 2*PI/NUM
1040 NEXT A
1050 SUBEND
1060 '
1070 MOVXY 160,50: TURNTO PI:GCLR
1085 CALLSUB PUTSTR(128,20,"TRIANGLE")
1090 PENDOWN:CALLSUB POLY(60,3):' TRIANGLE
1095 GCLR:CALLSUB PUTSTR(136,20,"SQUARE")
1100 PENDOWN:CALLSUB POLY(60,4): ' SQUARE
1105 GCLR:CALLSUB PUTSTR(136,20,"OCTAGON")
1110 PENDOWN: CALLSUB POLY(20,8):' OCTAGON
1115 GCLR: CALLSUB PUTSTR(136,20,"CIRCLE")
1120 PENDOWN: CALLSUB POLY(5,40): ' CIRCLE
1155 FOR A=1 TO 1000 :NEXT :TEXT :END
```

Listing 4. *Demo program 2; stars.*

```
10 ' DEMO TWO - STARS
20 PI=3.14159265
30 SUB STAR(SIZE,PNTS)
35 LOCAL T: T=PNTS/2
40 FOR A=1 TO PNTS
50 AHEAD SIZE: LEFT (T-1)/T*PI
60 NEXT
65 SUBEND
70 '
80 HIRES 0,13
90 PEN 1: PENDOWN
95 FOR B=8 TO 52 STEP 2
```

→

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Listing 4 continued.

```
96 MOVXY 80,70: GCLR: TURNTO 0
100 CALLSUB STAR(150,B)
101 FOR A=1 TO 500: NEXT A
105 NEXT B
120 TEXT: END
```

Listing 5. *Demo program 3; Hilbert curve.*

```
10 ' DEMO THREE - HILBERT CURVE
20 PI=3.14159265
25 DEF FN DEG(DEG)=DEG*PI/180
26 '
30 SUB HILBERT(SIZE,LEVEL,PARITY)
40 IF LEVEL=0 THEN EXIT
50 LEFT PARITY*FN DEG(90)
60 CALLSUB HILBERT(SIZE,LEVEL-1,-PARITY)
70 AHEAD SIZE
80 RIGHT PARITY*FN DEG(90)
90 CALLSUB HILBERT(SIZE,LEVEL-1,PARITY)
100 AHEAD SIZE
110 CALLSUB HILBERT(SIZE,LEVEL-1,PARITY)
120 RIGHT PARITY*FN DEG(90)
130 AHEAD SIZE
140 CALLSUB HILBERT(SIZE,LEVEL-1,-PARITY)
150 LEFT PARITY*FN DEG(90)
160 SUBEND
170 '
180 HIRES 0,1
185 MOVXY 260,30: TURNTO FN DEG(90)
190 PEN 1: PENDOWN: GCLR
200 CALLSUB HILBERT(5,5,1)
210 TEXT: END
```

Listing 6. *Demo program 4; duopoly.*

```
10 ' DEMO FOUR - DUOPOLY
20 COLOR3,3: PI= 3.14159265
25 DEF FN DEG(DEG)=DEG*PI/180
26 '
30 SUB DUOPOLY(S1,A1,S2,A2,LOOP)
40 LOCAL C: C=0
50 FOR A=1 TO LOOP
60 CALLSUB VECTOR(C*A1,S1)
70 CALLSUB VECTOR(C*A2,S2)
80 C=C+1
90 NEXT A
100 SUBEND
101 '
102 SUB VECTOR(DIR,SIZE)
103 TURNTO FN DEG(DIR): AHEAD SIZE
105 SUBEND
110 '
120 HOME: HIRES 1,0
130 PEN 1: PENDOWN: GCLR
131 ' GOTO 144
140 CALLSUB DUOPOLY(15,90,15,320,36)
141 HOME:GCLR
142 CALLSUB DUOPOLY(30,90,30,300,20)
143 MOVXY 160,70: GCLR
144 CALLSUB DUOPOLY(5 ,5,5 ,-9,362)
145 HOME: GCLR
146 CALLSUB DUOPOLY(9,20,9,-19,356)
147 MOVXY 160,10: GCLR
148 CALLSUB DUOPOLY(10,32,5,4,90)
150 TEXT: END
```

Listing 7. *Demo program 5; snowflake.*

```
10 ' DEMO FIVE - SNOWFLAKE
15 PI=3.14159265
16 ' CONVERT DEGREES TO RADIANS
17 DEF FN DEG(Y)=Y*PI/180
20 '
30 SUB SIDE(SIZE,LEVEL)
40 IF LEVEL=0 THEN AHEAD SIZE: EXIT
45 LOCAL DIV: DIV=3
50 CALLSUB SIDE(SIZE/DIV,LEVEL-1)
60 LEFT FN DEG(60)
70 CALLSUB SIDE(SIZE/DIV,LEVEL-1)
80 RIGHT FN DEG(120)
90 CALLSUB SIDE(SIZE/DIV,LEVEL-1)
100 LEFT FN DEG(60)
110 CALLSUB SIDE(SIZE/DIV,LEVEL-1)
120 SUBEND
130 '
135 ' PAUSE FOR SPECIFIED NO. OF SECONDS
140 SUB SLEEP(SECS)
150 FOR A=1 TO SECS*889: NEXT
160 SUBEND
170 '
175 ' DRAW A SNOWFLAKE
180 SUB SNOW-FLAKE(SIZE,LEVEL)
190 FOR A=1 TO 3
200 CALLSUB SIDE(SIZE,LEVEL)
201 RIGHT FN DEG(120)
203 NEXT A
205 SUBEND
210 '
220 HIRES 0,1
225 MOVXY 110,20: TURNTO FN DEG(90)
230 PENDOWN: PEN 1: GCLR
240 CALLSUB SNOW-FLAKE(180,4)
250 CALLSUB SLEEP(3): TEXT
260 END
```

Listing 8. *Demo program 6; nested triangles.*

```
10 ' DEMO SIX - NESTED TRIANGLES
20 PI=3.14159265
25 DEF FN DEG(DEG)=DEG*PI/180
26 '
30 SUB NEST(SIZE,LEVEL)
40 IF LEVEL=0 THEN EXIT
50 AHEAD SIZE/2
60 CALLSUB SUBNEST(SIZE,LEVEL)
70 AHEAD SIZE/2: RIGHT FN DEG(120)
80 AHEAD SIZE: RIGHT FN DEG(120)
90 AHEAD SIZE: RIGHT FN DEG(120)
100 SUBEND
110 '
120 SUB SUBNEST(SIZE,LEVEL)
130 RIGHT FN DEG(60)
140 CALLSUB NEST(SIZE/2,LEVEL-1)
150 LEFT FN DEG(60)
160 SUBEND
170 '
180 HIRES 0,1: MOVXY 100,30: GCLR
190 PEN 1: PENDOWN: TURNTO FN DEG(90)
200 CALLSUB NEST(150,5)
210 FOR A=1 TO 1000: NEXT A
220 TEXT: END
```

end A

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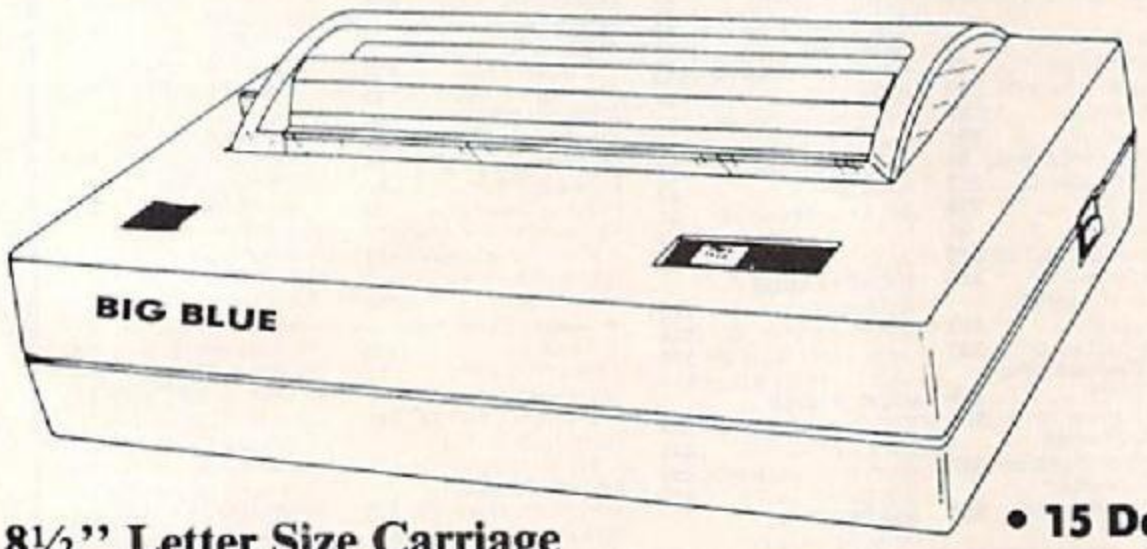

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Programmers, Take Note!

By BOB KODADEK

Jot down and recall your programming reminders with this instant-access utility.

While computing, how often do you have to spend time looking up Poke, Peek or SYS numbers because you forgot them? Or how often have you had an idea you wanted to write down quickly but were unable to find a pencil or paper handy? If you're like me, you end up making a lot of mental notes, then forgetting them.

With the accompanying program, 64 Notepad (Listing 1), you have an electronic pad, pencil and eraser at your fingertips.

The program adds a text window to your screen. The window has editing capability and does not affect your present screen. You can access it at the touch of a key, open and use it even while another program is running. When you close the window, your program continues without missing a byte, and your notes are safely stored in a memory that never forgets.

About the Program

Type in and save the Basic loader program (Listing 1). After running the program, press the CTRL-O key combination to open the window. When it first opens, the notepad will be filled with garbage; simultaneously press the shift and CLR/home keys to clear it. The notepad consists of 15 lines, each 38 spaces long. You may change your text color within the window by pressing CTRL-P.

The home, return, cursor and delete keys function as you would expect. The insert key, however, is disabled.

To close the window and return to the previous display, press CTRL-C. Simultaneously press the run/stop and restore keys to disable the utility. To restart, simply enter SYS 51072.

The IRQ vector has been altered to point to the Notepad routine, which checks about 60 times a second for the current key being pressed. When you press CTRL-O, the screen memory, color memory and zero-page are copied under the Basic ROM at 40960 ($A000). By using this area of free RAM for storage, all of Basic memory will be available for your other programs.

Next, after switching out the Basic ROM, the text window stored at 45056 ($B000) is copied to screen memory and instantly displayed. The program then enters a custom input routine, complete with cursor, awaiting your input.

When CTRL-C is pressed, the text window is moved back into its safe place under the Basic ROM, and all memory is restored to its original location. The routine ends with a jump to 65212 ($FEBC), which cleans everything up neatly.

Use with RUN Basic

This program can be used with Robert Rockefeller's RUN Basic (see p. 50). To use with RUN Basic, follow these procedures.

1. Load RUN Basic, then enter SYS 64738 to activate RUN Basic.
2. Load and run 64 Notepad. Enter SYS 51072 to activate it and enter information pertinent to the use of RUN Basic. Whenever you need to refer to programming information from within RUN Basic, simply press CTRL-O to open the notepad; to close it, press CTRL-C.

If you want to print out your notes, you may do so using *RUN*'s previously published screen dump utility (see "Print Your Screen," December 1984), which runs concurrently with Notepad, as does *RUN*'s 64 Perfect Typist checksum utility, the DOS wedge or any program that doesn't conflict with the memory area from 51072 to 51852.

Now get busy and take some notes! R

Address all author correspondence to Bob Kodadek, 3164 Surrey Lane, Aston, PA 19014.

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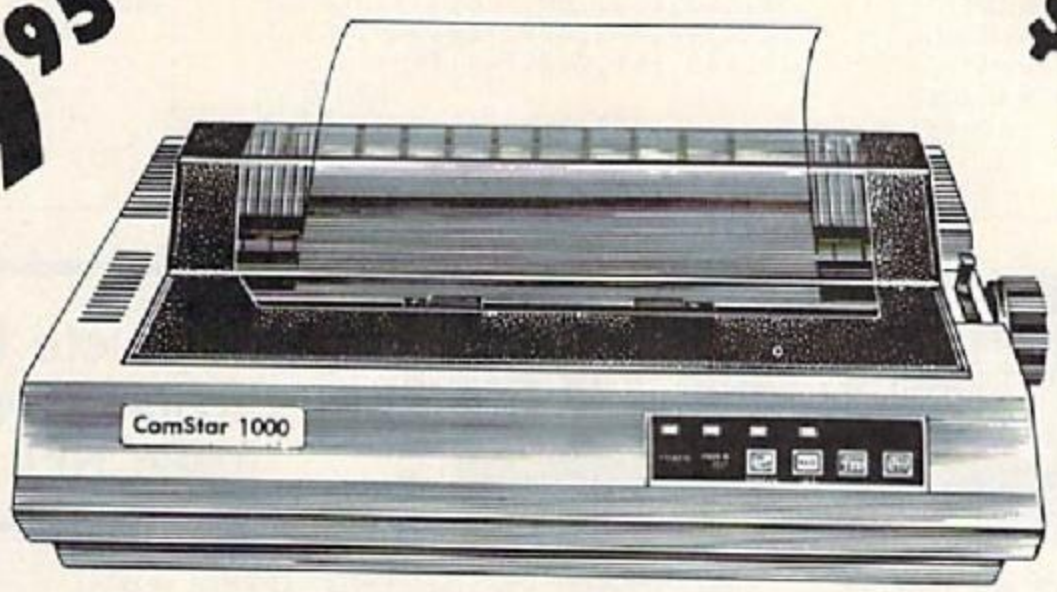

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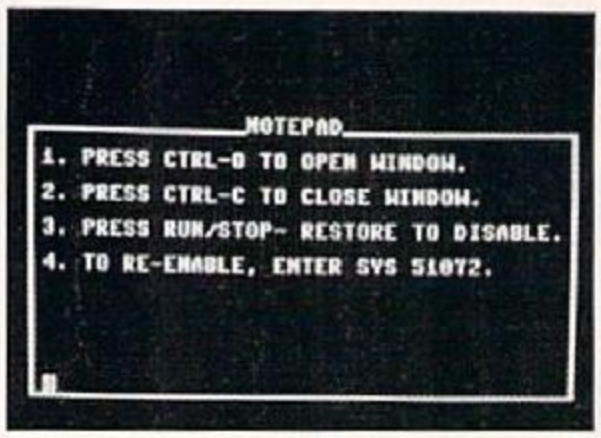
NOTEPAD
1. PRESS CTRL-O TO OPEN WINDOW.
2. PRESS CTRL-C TO CLOSE WINDOW.
3. PRESS RUN/STOP- RESTORE TO DISABLE.
4. TO RE-ENABLE, ENTER SYS 51072.

Listing 1. *64 Notepad program.*

```
1 REM{2 SPACEs}*-- 64 NOTEPAD LO
  ADER PROGRAM --*          :REM*87
2 REM *-- BOB KODADEK, ASTON PA
  19014 --*                 :REM*88
3 PRINT"READING DATA, WAIT ABOUT
   TEN SECONDS...":ML=51072:FORI
  =ML TO ML+735             :REM*67
4 READ A:POKEI,A:CK=CK+A:NEXT:IF
  CK<>90927 THENPRINT"DATA ERROR
  !":END                    :REM*132
5 PRINTCHR$(147)SPC(255)"64 NOTE
  PAD"                      :REM*85
6 PRINTSPC(83)"1. PRESS CTRL-O T
  O OPEN WINDOW."           :REM*156
7 PRINTSPC(83)"2. PRESS CTRL-C T
  O CLOSE WINDOW."          :REM*237
8 PRINTSPC(83)"3. PRESS RUN/STOP
  -RESTORE TO DISABLE."     :REM*106
9 PRINTSPC(43)"4. TO RE-ENABLE,
  ENTER SYS 51072.":SYS 51072
                            :REM*65
10 DATA120,173,020,003,141,059,2
   02,173,021,003,141,060
                            :REM*246
11 DATA202,169,171,141,020,003,1
   69,199,141,021,003,162
                            :REM*177
12 DATA009,160,001,142,061,202,1
   40,063,202,140,062,202
                            :REM*174
13 DATA169,000,141,139,202,088,0
   96,173,141,002,201,004
                            :REM*125
14 DATA208,011,165,197,201,038,2
   08,005,173,139,202,240
                            :REM*230
15 DATA003,108,059,202,169,255,1
   41,139,202,032,231,255
                            :REM*217
16 DATA169,000,133,212,173,134,0
   02,141,064,202,120,032
                            :REM*120
17 DATA059,201,032,070,201,169,0
   64,133,251,169,186,133:REM*25
18 DATA252,162,000,160,039,169,1
   18,145,251,200,169,117
                            :REM*238
19 DATA145,251,165,251,024,105,0
   40,133,251,144,002,230:REM*91
20 DATA252,232,224,016,208,229,1
   62,039,169,111,157,064
                            :REM*180
21 DATA186,169,119,157,192,188,2
   02,016,243,162,016,160:REM*31
22 DATA000,185,089,202,056,233,0
   64,157,064,186,232,200
                            :REM*212
23 DATA192,007,208,241,032,141,2
   01,088,032,059,201,174
                            :REM*155
24 DATA061,202,172,062,202,024,0
   32,240,255,056,032,240
                            :REM*182
25 DATA255,152,201,040,048,003,0
   56,233,040,168,142,061
                            :REM*159
26 DATA202,140,062,202,032,011,2
   02,165,204,240,008,164:REM*12
27 DATA211,177,209,009,128,145,2
   09,032,228,255,240,239
                            :REM*209
28 DATA201,003,208,025,032,059,2
   01,032,117,201,032,199:REM*54
29 DATA201,173,064,202,141,134,0
   02,169,000,141,139,202
                            :REM*113
30 DATA133,198,076,188,254,201,1
   45,208,010,174,061,202:REM*26
31 DATA224,010,048,033,076,155,2
   00,201,017,208,009,174
                            :REM*163
```

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Listing 1 continued.

```
32 DATAØ61,2Ø2,224,Ø23,24Ø,Ø19,2
   Ø8,Ø11,2Ø1,157,2Ø8,Ø16
                          :REM*186
33 DATA172,Ø62,2Ø2,192,ØØ1,24Ø,Ø
   Ø6,Ø32,Ø59,2Ø1,Ø32,21Ø
                          :REM*151
34 DATA255,Ø76,Ø49,2ØØ,2Ø1,Ø19,2
   Ø8,ØØ9,Ø32,Ø59,2Ø1,Ø32
                          :REM*192
35 DATAØ5Ø,2Ø1,Ø76,Ø49,2ØØ,2Ø1,1
   47,2Ø8,ØØ6,Ø32,Ø16,2Ø1
                          :REM*165
36 DATAØ76,Ø49,2ØØ,2Ø1,Ø13,2Ø8,Ø
   2Ø,174,Ø61,2Ø2,224,Ø23
                          :REM*236
37 DATA24Ø,Ø1Ø,Ø32,Ø59,2Ø1,232,1
   6Ø,ØØ1,Ø24,Ø32,24Ø,255
                          :REM*171
38 DATAØ76,Ø49,2ØØ,2Ø1,Ø2Ø,2Ø8,Ø
   17,169,Ø32,164,211,145 :REM*4
39 DATA2Ø9,172,Ø62,2Ø2,192,ØØ1,2
   4Ø,189,169,157,2Ø8,179:REM*23
4Ø DATA2Ø1,Ø29,Ø48,181,2Ø1,127,Ø
   16,177,172,Ø62,2Ø2,192
                          :REM*252
41 DATAØ38,24Ø,ØØ2,2Ø8,162,174,Ø
   61,2Ø2,224,Ø23,24Ø,161
                          :REM*255
42 DATAØ32,Ø59,2Ø1,Ø32,21Ø,255,1
   6Ø,ØØ1,232,Ø24,Ø32,24Ø
                          :REM*132
43 DATA255,Ø76,Ø49,2ØØ,162,Ø23,1
   42,Ø61,2Ø2,174,Ø61,2Ø2:REM*71
44 DATA16Ø,ØØ1,Ø24,Ø32,24Ø,255,1
   62,Ø37,169,Ø32,Ø32,21Ø:REM*94
45 DATA255,2Ø2,Ø16,248,2Ø6,Ø61,2
   Ø2,173,Ø61,2Ø2,2Ø1,ØØ8
                          :REM*147
46 DATA2Ø8,227,162,ØØ9,16Ø,ØØ1,Ø
   24,Ø32,24Ø,255,Ø96,Ø72
                          :REM*218
47 DATA164,211,177,2Ø9,Ø41,127,1
   45,2Ø9,1Ø4,Ø96,162,ØØØ
                          :REM*185
48 DATA181,ØØØ,157,ØØØ,176,189,Ø
   ØØ,ØØ5,157,ØØØ,177,189:REM*2Ø
49 DATAØØØ,ØØ6,157,ØØØ,178,189,Ø
   ØØ,ØØ7,157,ØØØ,179,189 :REM*1
5Ø DATAØØØ,217,157,ØØØ,18Ø,189,Ø
   ØØ,218,157,ØØØ,181,189:REM*42
51 DATAØØØ,219,157,ØØØ,182,232,2
   Ø8,212,Ø96,162,ØØØ,189
                          :REM*223
52 DATAØØØ,ØØ5,157,ØØØ,186,189,Ø
   ØØ,ØØ6,157,ØØØ,187,189
                          :REM*156
53 DATAØØØ,ØØ7,157,ØØØ,188,232,2
   Ø8,235,Ø96,169,Ø54,133
                          :REM*113
54 DATAØØ1,162,Ø64,189,ØØØ,186,1
   57,ØØØ,ØØ5,173,Ø63,2Ø2:REM*24
55 DATA157,ØØØ,217,232,2Ø8,241,1
   62,ØØØ,189,ØØØ,188,157 :REM*1
56 DATAØØØ,ØØ7,189,ØØØ,187,157,Ø
   ØØ,ØØ6,173,Ø63,2Ø2,157
                          :REM*19Ø
57 DATAØØØ,218,157,ØØØ,219,232,2
   Ø8,232,141,134,ØØ2,141
                          :REM*165
58 DATA135,ØØ2,169,Ø55,133,ØØ1,Ø
   96,12Ø,169,Ø54,133,ØØ1:REM*76
59 DATA162,ØØØ,189,ØØØ,177,157,Ø
   ØØ,ØØ5,189,ØØØ,178,157:REM*57
6Ø DATAØØØ,ØØ6,189,ØØØ,179,157,Ø
   ØØ,ØØ7,189,ØØØ,18Ø,157
                          :REM*242
61 DATAØØØ,217,189,ØØØ,181,157,Ø
   ØØ,218,189,ØØØ,182,157:REM*77
62 DATAØØØ,219,232,2Ø8,217,162,Ø
   57,189,ØØØ,176,149,ØØØ:REM*54
63 DATA232,2Ø8,248,162,Ø42,189,Ø
   ØØ,176,149,ØØØ,2Ø2,2Ø8:REM*37
64 DATA248,Ø88,Ø96,173,141,ØØ2,2
   Ø1,ØØ4,2Ø8,Ø39,165,197
                          :REM*242
65 DATA2Ø1,Ø41,2Ø8,Ø33,16Ø,1ØØ,1
   62,ØØØ,232,2Ø8,253,2ØØ
                          :REM*117
66 DATA2Ø8,248,238,Ø63,2Ø2,173,Ø
   63,2Ø2,2Ø1,Ø16,2Ø8,ØØ5
                          :REM*18Ø
67 DATA169,ØØØ,141,Ø63,2Ø2,12Ø,Ø
   32,117,2Ø1,Ø32,141,2Ø1
                          :REM*181
68 DATAØ88,Ø96,ØØØ,ØØØ,ØØØ,ØØØ,Ø
   ØØ,ØØØ,ØØØ,Ø66,Ø79,Ø66
                          :REM*144
69 DATAØ75,Ø79,Ø68,Ø65,Ø68,Ø69,Ø
   75,Ø44,Ø65,Ø83,Ø84,Ø79
                          :REM*157
7Ø DATAØ78,Ø44,Ø8Ø,Ø65,Ø67,Ø49,Ø
   57,Ø56,Ø53,Ø78,Ø79,Ø84:REM*84
71 DATAØ69,Ø8Ø,Ø65,Ø68    :REM*37
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Sign Maker

If you have something to say, say it in a big way—with a sign. This program lets you make and print out signs quickly and easily.

By KEN AMBERG

I own a printer that has an Enlarge mode for printing larger characters. The Enlarge mode is nice, but I wanted letters big enough to be visible across a room.

Sign Maker prints characters in two ways. One format produces the largest letters and prints them sideways down the paper, banner style, up to 40 characters high. The other format prints smaller characters on a standard 8½- by 11-inch sheet of paper.

The menu appears on the screen after you load and run the program. Press the f1 key to use the banner maker. Press the f3 key to use the single-sheet sign maker. The f5 key prints a forms-feed character and the f7 key ends the program and closes the print file.

To make a sign, simply answer the different questions the program asks.

How the Program Works

Sign Maker runs on the C-64, the C-128 and the VIC-20. You can tailor it to fit your own needs and printer.

Lines 10–30 determine which computer the program is running on and set variables accordingly.

Lines 100–230 open the print file and produce the menu screen. The logic flow of the program is controlled from this section.

Lines 500–560 control the banner print and call on lines 1000–1160 to translate the screen character memory into enlarged print characters.

Lines 2000–2090 are used only by the C-64. They move the C-64's character memory to an area that can be accessed by the program. (These and line 20 can be deleted if you use the VIC-20.)

Lines 3000–3070 constitute a routine that translates ASCII values into character memory positions.

Lines 4000–4170 accept the data for the Single Sheet mode and vertically center the print on the paper. Lines 5000–5150 examine the data line by line, character by character, and determine horizontal centering.

Lines 6000 to the end of the program translate the screen character memory into a printer character.

I've found plenty of uses for this little printer utility program. It's great for birthday messages and greetings, and my family always sees the notes I leave on the refrigerator. Experiment with this program; it could breathe new life into your printer, which is useful for more than just making program listings and reports. R

Address all author correspondence to Ken Amberg, 1832 Briarwood Terrace, South Belmar, NJ 07719.

RUN It Right

C-64; C-128 (in C-64 mode); VIC-20 Printer

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Listing 1. *Sign Maker program.*

```
1 REM{2 SPACEs}SIGN MAKER                    :REM*15
2 REM{3 SPACEs}BY KEN AMBERG                 :REM*234
3 REM{6 SPACEs}1832 BRIARWOOD TERR.          :REM*209
4 REM{6 SPACEs}SOUTH BELMAR, N.J. 07719      :REM*236
10 DIM A(7)                                  :REM*224
15 DIM B(8,8)                                :REM*23
20 IF PEEK(213) = 39 THEN S=49152:GOSUB2000
   :Z=10:GOTO 100                            :REM*198
30 Z=2:S=32768                               :REM*98
100 OPEN 4,4                                 :REM*204
110 PRINT "{SHFT CLR}"                       :REM*100
120 PRINT"{3 CRSR DNs}";TAB(Z+5);"SIGN MAKE
   R"                                        :REM*162
130 PRINT"{CRSR DN}";TAB(Z);"{CTRL 9}F1{CTR
   L 0} = BANNER"                            :REM*240
140 PRINT"{CRSR DN}";TAB(Z);"{CTRL 9}F3{CTR
   L 0} = SINGLE PAGE"                       :REM*36
150 PRINT"{CRSR DN}";TAB(Z);"{CTRL 9}F5{CTR
   L 0} = FORM FEED"                         :REM*72
160 PRINT"{CRSR DN}";TAB(Z);"{CTRL 9}F7{CTR
   L 0} = EXIT PROGRAM"                      :REM*244
170 GET A$:IFA$=""THEN170                    :REM*240
180 IF A$<"{FUNCT 1}" OR A$>"{FUNCT 7}" THE
   N 110                                     :REM*126
190 IF A$="{FUNCT 7}" THEN PRINT#4:CLOSE4:E
   ND                                        :REM*52
200 IF A$="{FUNCT 5}" THEN PRINT#4,CHR$(12)
   :GOTO110                                  :REM*180
210 IF A$="{FUNCT 1}" THEN GOSUB 500:GOTO11
   0                                         :REM*238
220 IF A$="{FUNCT 3}" THEN GOSUB 4000:GOTO1
   10                                        :REM*40
230 GOTO 110                                 :REM*176
500 PRINT"{SHFT CLR}"                        :REM*235
510 PRINT"PLEASE ENTER PHRASE"               :REM*193
512 PRINT" TO BE PRINTED"                    :REM*28
515 INPUT A$                                 :REM*103
520 LP=LEN(A$)                               :REM*130
530 FOR C=1TOLP                              :REM*38
540 GOSUB 1000                               :REM*244
550 NEXT C                                   :REM*76
560 RETURN                                   :REM*108
1000 L1$="{20 SPACEs}"                       :REM*201
1010 X$=MID$(A$,C,1)                         :REM*207
1011 SC=ASC(X$)                              :REM*14
1012 GOSUB3000                               :REM*221
1015 CS = S + (SC * 8)                       :REM*214
1020 FOR I = 0TO7                            :REM*71
1030 A(I)=PEEK(CS+I)                         :REM*38
1040 NEXT                                    :REM*30
1050 FOR BIT = 7TO0STEP-1                    :REM*184
1060 FOR BYTE = 7TO0 STEP-1                  :REM*124
1070 IF (A(BYTE) AND (2{UP ARROW}BIT)) THEN
    GOTO 1100                                :REM*142
1080 L1$=L1$+"{6 SPACEs}"                    :REM*194
1090 GOTO 1110                               :REM*60
1100 L1$=L1$+"******"                        :REM*154
1110 NEXT BYTE                               :REM*232
1120 PRINT#4,L1$                             :REM*18
1130 PRINT#4,L1$                             :REM*28
1145 L1$="{20 SPACEs}"                       :REM*91
1150 NEXT BIT                                :REM*188
1160 RETURN                                  :REM*198
2000 PRINT:PRINT"I AM MOVING THE CHARACTER
   SET"                                      :REM*143
2010 PRINT"IT TAKES A MINUTE.....":REM*249
2020 POKE56334,0                             :REM*47
2030 POKE1,51                                :REM*145
2040 FOR A=0TO2047                           :REM*249
2050 POKE49152+A,PEEK(53248+A)               :REM*22
2060 NEXTA                                   :REM*40
2070 POKE1,55                                :REM*188
2080 POKE56334,129                           :REM*0
2090 RETURN                                  :REM*108
3000 IFSC<32THENSC=128:RETURN                :REM*33
3010 IFSC<64THENRETURN                       :REM*173
3020 IFSC<96THENSC=SC-64:RETURN              :REM*43
3030 IFSC<128THENSC=SC-32:RETURN             :REM*217
3040 IFSC<160THENSC=128:RETURN               :REM*255
3050 IFSC<192THENSC=SC-64:RETURN             :REM*111
3060 IFSC<255THENSC=SC-128:RETURN            :REM*241
3070 SC=94:RETURN                            :REM*127
4000 PRINT"{SHFT CLR}"                       :REM*165
4002 PRINT"{2 CRSR DNs} ENTER UP TO 5 LINES
   "                                         :REM*21
4003 PRINT" 8 OR LESS LETTERS"               :REM*34
4004 PRINT"{2 SPACEs}PER LINE"               :REM*9
4005 L1$=""                                  :REM*162
4010 INPUT"ENTER LINE 1";L1$                 :REM*135
4020 IFL1$=""THEN RETURN                     :REM*85
4025 L=1:L$(1)=LEFT$(L1$,8):L1$=""           :REM*196
4030 INPUT"ENTER LINE 2";L1$                 :REM*29
4040 IFL1$=""THEN 4100                       :REM*147
4045 L=2:L$(2)=LEFT$(L1$,8):L1$=""           :REM*234
4050 INPUT"ENTER LINE 3";L1$                 :REM*177
4060 IFL1$=""THEN 4100                       :REM*167
4065 L=3:L$(3)=LEFT$(L1$,8):L1$=""           :REM*16
4070 INPUT"ENTER LINE 4";L1$                 :REM*69
4080 IFL1$=""THEN 4100                       :REM*187
4085 L=4:L$(4)=LEFT$(L1$,8):L1$=""           :REM*54
4090 INPUT"ENTER LINE 5";L1$                 :REM*217
4095 IFL1$=""THEN4100                        :REM*202
4097 L=5:L$(5)=LEFT$(L1$,8)                  :REM*75
4100 W=12*L                                  :REM*180
4110 W1=INT((60-W)/2) + 5                    :REM*128
4120 FOR W = 1 TO W1                         :REM*66
4130 PRINT#4," "                             :REM*86
4140 NEXT                                    :REM*70
4150 FOR X ={2 SPACEs}1 TO L                 :REM*176
4160 GOSUB 5000                              :REM*70
4165 NEXT                                    :REM*95
4170 RETURN                                  :REM*148
5000 LL=LEN(L$(X))                           :REM*181
5010 FOR X1 = 1 TO LL                        :REM*89
5020 W$= MID$(L$(X),X1,1)                    :REM*185
5030 SC = ASC(W$)                            :REM*81
5040 GOSUB3000                               :REM*169
5050 CS=S+(SC*8)                             :REM*169
5060 FOR X2 = 0 TO 7                         :REM*175
5070 B(X1,X2)=PEEK(CS+X2)                    :REM*233
5080 NEXT X2                                 :REM*219
5090 NEXT X1                                 :REM*213
5100 LC=INT((80-(LL*10))/2)                  :REM*195
5110 PL$=""                                  :REM*223
5115 IF LC=0THEN5150                         :REM*246
5120 FOR X1 = 1 TO LC                        :REM*182
5130 PL$=PL$+" "                             :REM*186
5140 NEXT                                    :REM*50
5150 SL$=PL$                                 :REM*216
6000 FOR X2=0 TO 7                           :REM*95
6010 FOR X1=1 TO LL                          :REM*69
6020 FOR BIT=7 TO 0 STEP -1                  :REM*53
6030 IF(B(X1,X2) AND (2{UP ARROW}BIT)) THEN
    6045                                     :REM*249
6040 PL$=PL$+" ":GOTO 6050                   :REM*107
6045 PL$=PL$+MID$(L$(X),X1,1)                :REM*48
6050 NEXT BIT                                :REM*243
6060 PL$=PL$+"{2 SPACEs}"                    :REM*131
6070 NEXT X1                                 :REM*173
6080 PRINT#4,PL$                             :REM*205
6090 PL$=SL$                                 :REM*59
6100 NEXT X2                                 :REM*219
6110 PRINT#4," "                             :REM*25
6120 PRINT#4," "                             :REM*35
6130 PRINT#4," "                             :REM*45
6140 PRINT#4," "                             :REM*55
6150 RETURN                                  :REM*88
```

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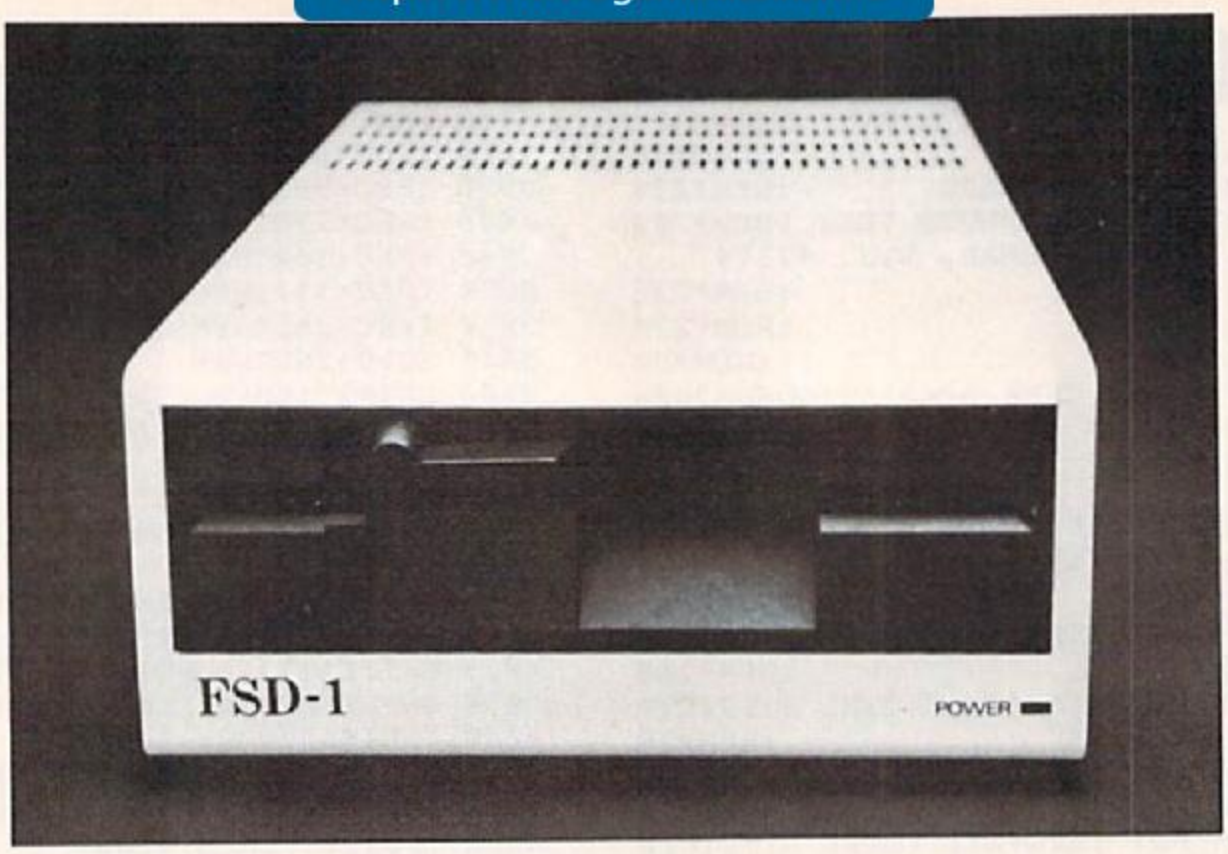

The FSD-1 Disk Drive—a Viable Alternative

By BILL RUDDICK

Here's a new, low-cost disk drive that offers improvements over the Commodore 1541.

The 5¼-inch FSD-1 disk drive from Emerald Component International is another Commodore 1541 disk drive emulator that's touted by the manufacturer to work better than the 1541. Having had experience with such claims before, I was not optimistic as I opened the box. However, testing of the FSD-1 has convinced me that this drive does measure up to the 1541 and in some respects is superior. I like it so much, in fact, that I now own three of them.

Opening the Boxes

As I perused the accompanying literature, I was pleased to discover that the FSD-1 does not offer super-enhanced features that usually destroy compatibility with commercial software, nor does it attempt to reinvent data-communication logic.

When I slipped the first FSD-1 from its carton, I was glad to find it made of metal rather than plastic. Metal is more durable than plastic, tends to disperse heat better and blocks radio-frequency interference more effectively.

The Emerald drive has an attractive design, and, at 6⅞ × 13 × 2¾ inches, is smaller than the 1541. Its white-with-brown color goes well with the C-128 and the new 64C, but clashes somewhat with the C-64. It has a lever drive door similar to late model 1541s and the 1571.

When I turned the drive upside down, I was pleased to find a dip switch bank similar to that on the Commodore 1571. Owners of 1541s have to change device numbers via software, which is temporary, or by disassembling the drive and installing a switch, which is a risky undertaking for the inexperienced and voids the warranty. I thought how nice it would be to use these easily switchable drives with my four-drive bulletin board system. The FSD-1 also has the two standard nine-pin serial ports on the back to allow for drive chaining or printer interfacing.

Software Tests

For my first test of the FSD-1, I connected two of them to my bulletin board, one for the main message base and one for on-line software transfer. After 72 hours of non-stop operation, the drives were working flawlessly. All my relative-based message files were intact. New records were added to the files and old records purged without a single error, and the drives remained cool.

Next I loaded and ran some commercial business programs, including

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	FSD-1	1541
1541 DOS compatible	yes	yes
Loads protected software	yes	yes
C-128 compatible in 64 mode	yes	yes
Save with Replace capability	yes	no
R/W head stays aligned	yes	no
Switchable device number	yes	no
Storage capacity in K	174	174
Buffer capacity in K	2	2
Bytes per sector	256	256
Directory entries per disk	144	144
Tracks	35	35
Format time in seconds	90	90
Speed in RPM	308	308
Consistent speed	yes	no
Power supply in watts	25	25
Metal case	yes	no
Price (suggested retail)	$139	$199
Warranty	6 months	90 days

Table 1. *Comparison of the FSD-1 and Commodore's 1541 drives.*

Superbase 64, PaperClip, The Consultant, MultiPlan, Calc-Kit, Practi-Calc, The Financial Cookbook, Net Worth and The Complete Personal Accountant. They all ran without a hitch, handling both the program and data files efficiently.

Moving on to my game library, I loaded and ran Impossible Mission, Winter Games, Sword of Fargoal, Jumpman and several others from Epyx with the FSD-1, and they all worked well. I noticed that when protection errors occurred, the read/write head clattered, but not as loudly as that of the 1541. Sky Fox, Adventure Construction Set, One on One and Archon I and II from Electronic Arts also loaded properly. The Adventure Construction Set actually seemed to load faster than it does on the 1541.

After testing a plethora of commercial games, I was convinced the FSD-1 is compatible with a majority of copy-protected commercial software. It also loaded all the Basic and machine-language programs I fed it, and the Save with Replace command worked flawlessly.

I did discover that the FSD-1 shares the 1541's slow disk accessing and formatting times, and it uses the same peculiar DOS commands as the 1541—for the purpose, I assume, of reading the 1541 software protection schemes. The manual is light on information in some of the areas, but is relatively error-free.

I would recommend against following the FSD disk-operating command structure, as it is far too long. Instead, you can use the standard 1541 format or the 1541 wedge. Also, the FSD-1 works with the Mach 5 fast-load cartridge from Access and the Fast Load cartridge from Epyx, both of which contain improved, one-key commands that are easy to use.

Hardware Tests

The hardware diagnostic tests I performed on my three FSD-1s, using C-64 Doctor, CSM's 1541 Alignment Utility and the DUCK Utility, produced favorable results. Speed was consistent, track formatting was true, and the diagnostic data did not deviate between the three units.

To summarize, the FSD-1 certainly surprised me, because I've been disappointed by 1541 emulators in the past. It operates identically to the 1541 in reading, writing, saving and error-handling. It appears to be superior to the 1541 in hardware design, because it runs cooler and more quietly.

I have confidence in the FSD-1's C-64 software compatibility, because it loaded every program I tested. It also supported all the fast-load software I tried.

To top things off, at $139 the price is right, and the FSD-1 carries a six-month warranty, a real pleasure in these days of 90-day limits.

Emerald deserves kudos for offering a truly viable alternative to the 1541. For more information on the FSD-1 disk drive, write to Emerald Component International, 541 Willamette St., Eugene, OR 97401. R

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Instant Data Statements

By THOMAS H. SIMMONDS, JR. and JIM BORDEN

This article presents two versions of a utility that enables you to incorporate machine-language routines into your Basic programs. Listing 1, for the C-64, and Listing 2, for the C-128, Peek anywhere in random access memory and transcribe the hexadecimal machine language there into lines of Basic Data statements. The transcriber then deletes itself, leaving the Basic Data lines for you to add to or merge with an existing program. This is an ideal way to add custom characters or sprites to a program after they've been generated by an editor program.

When you need to add a machine-language routine to a Basic program, reach for this utility. It automatically makes Data statements out of hex code.

The C-64 Version

Type in Listing 1. Because the transcriber uses Pokes to the keyboard buffer and the dynamic keyboard (see the "Basically Speaking" column, *RUN*, June 1986, p. 88), the line numbers and the contents of the lines must be typed in exactly as they appear here. Also, since the transcriber erases itself after it's finished its job, be sure to save it on tape or disk before you run it.

Use a "filename",8,1 format to load RAM with the machine language you wish to transcribe into Data statements. Now load Listing 1, run it, and type in the information requested. Be sure the starting Basic line number is greater than the highest line number in the transcriber. You may want to choose line numbers and a line-number increment that will be compatible with the program to which you plan to add the Data statements.

Then enter the beginning and ending RAM locations to be transcribed. The transcriber will cycle through, writing Data statements and then line numbers to the screen until it has processed the last memory location you designated. When it's done, save the statements to tape or disk, clear the computer and load the program you are adding the statements to. Then, in Direct mode, type the following as one line and press the return key:

```
L=256*PEEK(46)+PEEK(45)-2:LH=INT(L/256):LL=L-256*LH:POKE43,LL:POKE44,LH:CLR
```

Next, load the Data statements and, in Direct mode again, enter the following line and press return:

```
POKE43,1:POKE44,8
```

Now List the program. It should include the Data statements. Note that these two last steps can be used to merge any Basic programs.

The C-128 Version

Listing 2 is the transcriber for the Commodore 128. It takes advantage of some Basic 7.0 keywords, but also allows data to be read from any bank of memory. In the 128 version, the F1 key replaces the dynamic keyboard.

Lines 1 through 7 of Listing 2 are about the same as those in Listing 1. Line 9 saves the present definition of the F1 key, so it can be restored after the transcriber has completed its work. Line 10 defines F1 to Home plus 25 returns. By using the F1 key rather than the dynamic keyboard, you can print 20 lines on the screen at a time. Line 10 also sets Z to point to line 11, and sets the memory bank to the one you specify.

Line 11 begins the actual printing sequence by setting variable J (the line counter) to 1 and clearing the screen. Line 12 checks to see if the 20th line has been printed. If it has, then J equals 21 and the program continues at line 13.

Line 13 prints the Data statements to the screen, and the dynamic keyboard technique enters those statements into the computer. Execution then depends on the value of Z. If Z is 11, execution reverts to line 11 to create another 20 lines of Data statements. When the last of the data has been processed, the value of Z becomes 18, and execution passes to line 18, which erases the transcriber.

Line 13 also contains three Pokes. The first clears any non-function keys from the buffer. The second is the length of the K1 string—the requisite number of returns plus one for the Home character. The last is the index to the location of the string. This

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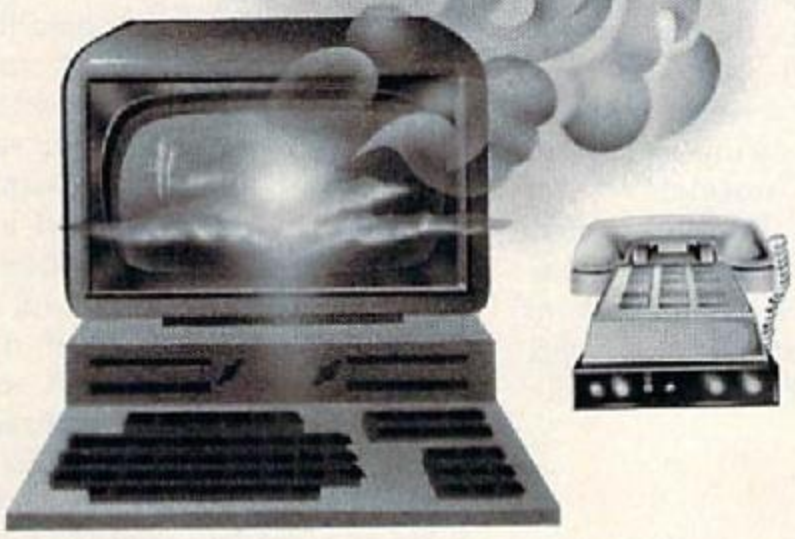

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value equals the actual location minus 4106 and is always zero for the F1 key's string.

Line 14 starts building the Data statements by printing a line number (FL), the word DATA and a space. Then line 15 initiates the loop that prints eight items of data per line. You can change the 7 to 15 if you have an 80-column screen. Line 15 ends by increasing the memory-location variable (FM) to the RAM location the transcriber will Peek next.

Line 16 actually prints the data (which was formatted as a string to drop the leading space), including commas to separate the data items. It then checks to see if the next memory location is greater than the last location to transcribe. If it is, line 16 sets the loop counter to its current value plus 100. This flag signals that the last data item has been transcribed. If you must exit a For-Next loop, this is one way to do it.

Line 17 loops back until the number of bytes in the For statement appears on the screen. Then it moves the cursor right and prints a space to eliminate the last comma. Line 17 also increases the counter (J), adds the proper interval to the line number (FL) and checks the "finished" flag. Finally, if all the data has been processed (I>100), Z is set to 18 to erase the transcriber, as I mentioned earlier.

The ELSE in line 17 is a Basic 7.0 keyword that provides for an alternative when an If-Then statement is false. Here, if I is not greater than 100, the program loops back to line 12 (without changing the value of Z).

Line 18 executes another 7.0 keyword, DELETE, which is used to erase one or more lines. In this case, all the program lines are deleted, so line 18 produces only a blank line and the word READY. That's the reason for the two extra Print statements. Finally, the 7.0 keyword KEY in line 18 assigns the original string to F1 and returns the bank to "normal."

Line 19 executes the returns necessary for the Delete and Key statements and pulls a SHFT CLR from the dynamic keyboard (POKE 208,1 and POKE 842,147) to clear the screen.

To add the Data statements to the main program, first load the main program, then, in Direct mode, type:

```
GRAPHIC CLR:T = 65278 - FRE(0):POKE46,
T/256:POKE45,T - PEEK(46)*256
```

and press the return key. Next, load the Data statements and then type, again in Direct mode:

```
POKE45,1:POKE46,28
```

and press return. Now you can list the combined program. As with the C-64 version, you can use this procedure to combine any Basic programs.

Variable Storage

A note on how variables are stored is in order here. You'll notice that the C-64 version of the transcriber has to Poke all the variables and later Peek them, but the 128 version does not. The 64 stores numeric variables at the end of a Basic program, where they may be overwritten if a line is changed. That's why Basic does a CLR in the 64 any time you revise a line.

With the transcriber, if the variables weren't Poked into memory, they'd all contain a value of zero after the program read in the first line of data. The 128 uses a separate bank of RAM to store its variables, and Basic doesn't affect it when changing, adding or deleting lines.

Users of the C-128 should keep this in mind. It's usually possible to change a line and then go right on executing the program. If, for example, you get a syntax error in line 500, you can list the line and correct the error, then continue the program by typing GOTO500 and pressing the return key. This is a way to avoid long setup delays while debugging programs, a trick you'll appreciate more and more as your programming skill improves.

Using this transcriber utility to make Data statements is an easy way to build a library of subroutines, each starting at a different line number, that can later be incorporated into a main program. By keeping a list of the starting line numbers, you can then include GOSUBs to any of them when you're writing a main program. After you append the subroutine and renumber, Basic 7.0 will handle all the GOTO and GOSUB addresses for you. R

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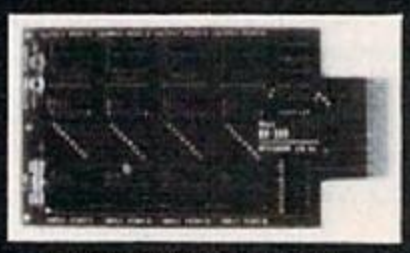

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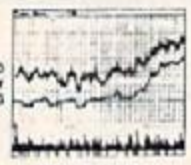

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Listing 1. *The C-64 version of the transcriber routine.*

```
1 IFFRE(1)>5ØØØØTHENPRINT"FOR C-64 ONLY!!":
  END:REM MOD BY R L ADAMS 3/84     :REM*113
2 PRINT"{SHFT CLR}{2 CRSR DNs} MEMORY TO DA
  TA ST."                           :REM*58
3 PRINT"{2 CRSR DNs} ENTER FIRST DATA LINE
  NUMBER":INPUTFL                   :REM*23
4 IFFL<5ØTHENPRINT"MUST BE >5Ø":GOTO3
                                    :REM*23Ø
5 PRINT" ENTER LINE NUMBER INTERVAL":INPUTL
  I                                 :REM*15
6 PRINT" ENTER FIRST LOCATION IN MEMORY TO
  BE{4 SPACEs}PUT IN DATA ST.":INPUTFM
                                    :REM*242
7 PRINT" ENTER LAST LOCATION IN MEMORY TO B
  E PUT IN DATA ST.":INPUTLM        :REM*161
8 IFLM=<FM THEN7                    :REM*76
9 J=1:PRINT"{SHFT CLR}";            :REM*97
1Ø POKE1ØØØ,J:T=INT(LI/256):POKE1ØØ1,T:POKE
   1ØØ2,LI-T*256:T=INT(FL/256)      :REM*214
11 POKE1ØØ3,T                       :REM*51
12 POKE1ØØ4,FL-T*256:T=INT(FM/256):POKE1ØØ5
   ,T:POKE1ØØ6,FM-T*256:T=INT(LM/256)
                                    :REM*96
13 POKE1ØØ7,T:POKE1ØØ8,LM-T*256     :REM*113
14 IFJ/4<>INT(J/4)GOTO16            :REM*234
15 PRINT"{CTRL 7}GOTO24":POKE198,1Ø:POKE631
   ,19:FORK=1TO9:POKE631+K,13:NEXT:END
                                    :REM*41
16 J=PEEK(1ØØØ):LI=PEEK(1ØØ1)*256+PEEK(1ØØ2
   ):FL=PEEK(1ØØ3)*256+PEEK(1ØØ4)   :REM*22Ø
17 FM=PEEK(1ØØ5)*256+PEEK(1ØØ6):LM=PEEK(1ØØ
   7)*256+PEEK(1ØØ8)                :REM*161
18 NU=(J-1)*LI+FL:PRINTNU"DATA";    :REM*178
19 FORI=ØTO7:M=FM+(J-1)*8+I:HX=PEEK(M):HX$=
   STR$(HX):HX$=RIGHT$(HX$,LEN(HX$)-1)
                                    :REM*75
2Ø IFI=7THENPRINTHX$:GOTO22         :REM*24
21 PRINTHX$",";                     :REM*253
22 IFM=(LM)THENPRINT"{CRSR LF} ":GOTO25
                                    :REM*21Ø
23 NEXTI:J=J+1:GOTO1Ø               :REM*133
24 PRINT"{SHFT CLR}{COMD 7}";:GOTO16 :REM*8
25 PRINT"{COMD 7}GOTO26":POKE198,1Ø:POKE631
   ,19:FORK=1TO9:POKE631+K,13:NEXT:END
                                    :REM*243
26 J=Ø:PRINT"{SHFT CLR}";           :REM*98
27 FORK=JTOJ+7:PRINTK:NEXT:POKE1ØØØ,K
                                    :REM*95
28 IFK<32THENPRINT"GOTO31"          :REM*21Ø
29 POKE198,1Ø:POKE631,19:FORK=1TO9:POKE631+
   K,13:NEXT:PRINT"{COMD 7}":END    :REM*37
3Ø J=PEEK(1ØØØ):GOTO27              :REM*38
31 PRINT"{CTRL 7}{SHFT CLR}";:GOTO3Ø
                                    :REM*189
```

Listing 2. *The C-128 version of the transcriber routine.*

```
1 IFFRE(1)<5ØØØØTHENPRINT"FOR C-128 ONLY!!"
  :END:REM C-128 VERSION BY JIM BORDEN
                                    :REM*41
2 PRINT"{SHFT CLR}{2 CRSR DNs}C-128 MEMORY
  TO DATA STATEMENTS"               :REM*252
3 INPUT"{2 CRSR DNs}ENTER FIRST DATA LINE N
  UMBER";FL                         :REM*87
4 IFFL<2ØTHENPRINT"LINE MUST BE >19":GOTO3
                                    :REM*148
5 INPUT"{CRSR DN}LINE NUMBER INTERVAL";LI
                                    :REM*25
6 INPUT"{CRSR DN}FIRST LOCATION FROM MEMORY
  ";FM                              :REM*126
7 INPUT"{CRSR DN}LAST LOCATION FROM MEMORY{
  2 SPACEs}";LM:IFLM<=FMGOTO7       :REM*63
8 INPUT"{CRSR DN}BANK NUMBER WHERE DATA IS
  STORED{3 SPACEs}15{4 CRSR LFs}";BN:IFBN<Ø
  ORBN>15GOTO8                      :REM*126
9 K1=PEEK(4Ø96):K1$="":FORX=1TOK1:K1$=K1$+C
  HR$(PEEK(41Ø5+X)):NEXT            :REM*13
1Ø A$=CHR$(19):FORX=1TO25:A$=A$+CHR$(13):NE
   XT:KEY1,A$:Z=11:BANK BN          :REM*66
11 J=1:PRINT"{SHFT CLR}";           :REM*99
12 IFJ<21GOTO14                     :REM*184
13 PRINT"GOTO"Z:POKE2Ø8,Ø:POKE2Ø9,J+1:POKE2
   1Ø,Ø:END                         :REM*29
14 PRINTFL"DATA ";                  :REM*124
15 FORI=ØTO7:HX=PEEK(FM):HX$=STR$(HX):HX$=R
   IGHT$(HX$,LEN(HX$)-1):FM=FM+1    :REM*123
16 PRINTHX$",";:IFFM>LM THENI=I+1ØØ:REM*18Ø
17 NEXTI:PRINT"{CRSR LF} ":J=J+1:FL=FL+LI:I
   FI>1ØØTHENZ=18:GOTO13:ELSE GOTO12
                                    :REM*237
18 PRINT"{SHFT CLR}DELETE-19":PRINT:PRINT:P
   RINT"KEY1,K1$:BANK 15            :REM*13Ø
19 POKE2Ø8,1:POKE2Ø9,3:POKE21Ø,Ø:POKE842,14
   7:END                            :REM*159
```

end R

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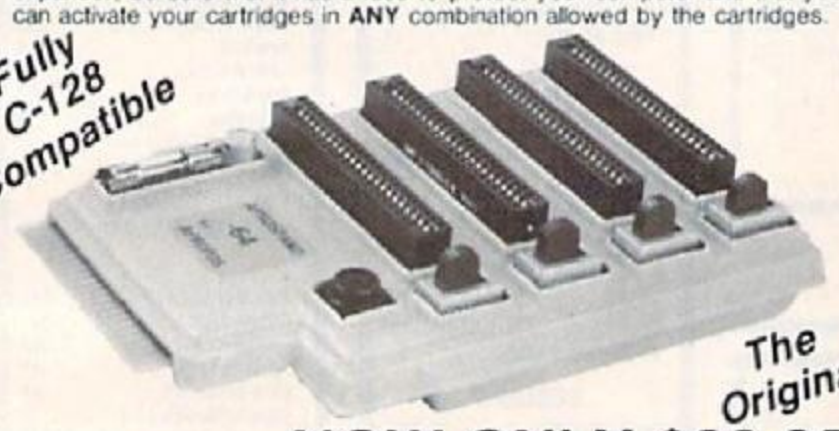

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Program Enhancement

In response to reader requests, Joe Kaczynski has submitted a print routine for incorporation into his Songfest program (April 1986, p. 30). This will give you a hard copy of your notes as an aid in the editing process. The routine works with menu options I (input) and E (error correction). Change existing lines as follows:

```
115 IF A$="I" THEN GOSUB 191: GOTO 195
120 IF A$="A" THEN Z=2: I=IM: D=IM: PRINT "{SHFT CLR}":
    GOSUB 191: GOTO 240
135 IF A$="E" THEN Z=3: PRINT "{SHFT CLR}": GOSUB 191:
    GOTO 645
270 IF Z=3 THEN Z=0: IF HC$="Y" THEN PRINT#4: CLOSE4:
    GOTO 20
370 NEXT: Z=0: IF HC$="Y" THEN PRINT#4: CLOSE4: GOTO 20
```

The following lines are new:

```
191 INPUT {3 CRSR DNs} {COMD 6} "WANT A HARD COPY OF
    YOUR NOTES Y/N";HC$: IF HC$<>"Y" THEN RETURN
192 IF A$="A" OR A$="E" AND HC$="Y" THEN OPEN 4,4,0:
    RETURN
193 PRINT "{2 CRSR DNs} {CTRL 3} BE SURE PRINTER IS
    TURNED ON {CTRL 7} {3 CRSR DNs}": INPUT "SONG TITLE
    {CTRL 2}";ST$: OPEN 4,4,0
194 PRINT#4,ST$: RETURN
261 IF HC$="Y" THEN PRINT#4, "VOICE # "K " NOTE INPUT
    DATA"
344 IF DR%=1 AND HC$="Y" THEN PRINT#4,"{2 SPACES}
    MEAS. "B "TO "C
361 IF HC$="Y" THEN PRINT#4, "{2 SPACES} MEAS. "B "TO "C
701 IF HC$="Y" THEN PRINT#4, "ERROR CORRECTION MADE
    TO VOICE ";VB%
702 IF HC$="Y" THEN PRINT#4,NP$; ",";NO; ",";ND;
711 IF HC$="Y" AND A$="A" THEN PRINT#4, "CONTINUING"
712 IF HC$="Y" THEN PRINT#4,NP$; ",";NO; ",";ND;
716 IF NP$="0" AND HC$="Y" THEN PRINT#4:PRINT#4
```

Q-Link Happenings

QuantumLink has recently added several new services for its subscribers:

—CIN (Commodore Information Network) News alerts users to current and upcoming events of interest to Commodore owners.
—New Product Information offers news about Commodore's latest hardware and software developments.
—Magazine Rack lets users browse through excerpts of magazine articles.
—The Funny Bone, a new service added to the Just for Fun department, promises humorous entertainment.

Berkeley Softworks, developer of the GEOS desktop operating system, now provides updated GEOS information and support on Q-Link. Activities in the GEOS Special Interest Group include message boards, a software library and a monthly conference.

Q-Link's Mall has also been expanded and now offers Commodore products to Q-Link members at special discount prices. Members can also save money by participating in Q-Link's live auctions held several times each month. R

Programming Briefs

Here's a list of often-used Pokes, calls, commands and numbers for your C-64, conveniently grouped to save you time.

Poke information

POKE646,color#	Color of text character
POKE63280,color#	Color of border
POKE53281,color#	Color of background
POKE650,128	All keys repeat
POKE650,0	Disables the repeat
POKE53272,21	Uppercase/graphics
POKE53272,23	Lowercase/uppercase
POKE649,0	Disables keyboard
POKE649,10	Enables keyboard
POKE649,10:POKE808,237	Restores keyboard
POKE819,245:POKE818,32	Disables save
POKE818,245:POKE818,237	Enables save
POKE775,200	Disables list
POKE775,167	Enables list
POKE53265,31	Lowers topmost screen line
POKE198,0	Clears keyboard buffer
POKE793,203	Disables restore
POKE808,237	Enables stop, restore, list
POKE808,225	Disables stop, restore, list
POKE788,52:POKE808,239	Disables stop
POKE788,49:POKE808,237	Enables stop

System calls

SYS 58692	Clear/home
SYS 58726	Home position
SYS 59903	Clears entire line of text
SYS 59062	Advances cursor
SYS 59626	Scrolls up a line
SYS 59137	Back to previous line
SYS 64738	Cold start
SYS 65511	Closes all open files

Color Poke chart

0	Black
1	White
2	Red
3	Cyan
4	Purple
5	Green
6	Blue
7	Yellow
8	Orange
9	Brown
10	Lt. Red
11	Gray 1
12	Gray 2
13	Lt. Green
14	Lt. Blue
15	Gray 3

(Compiled by Mary D. Brigito, Old Forge, NY.)

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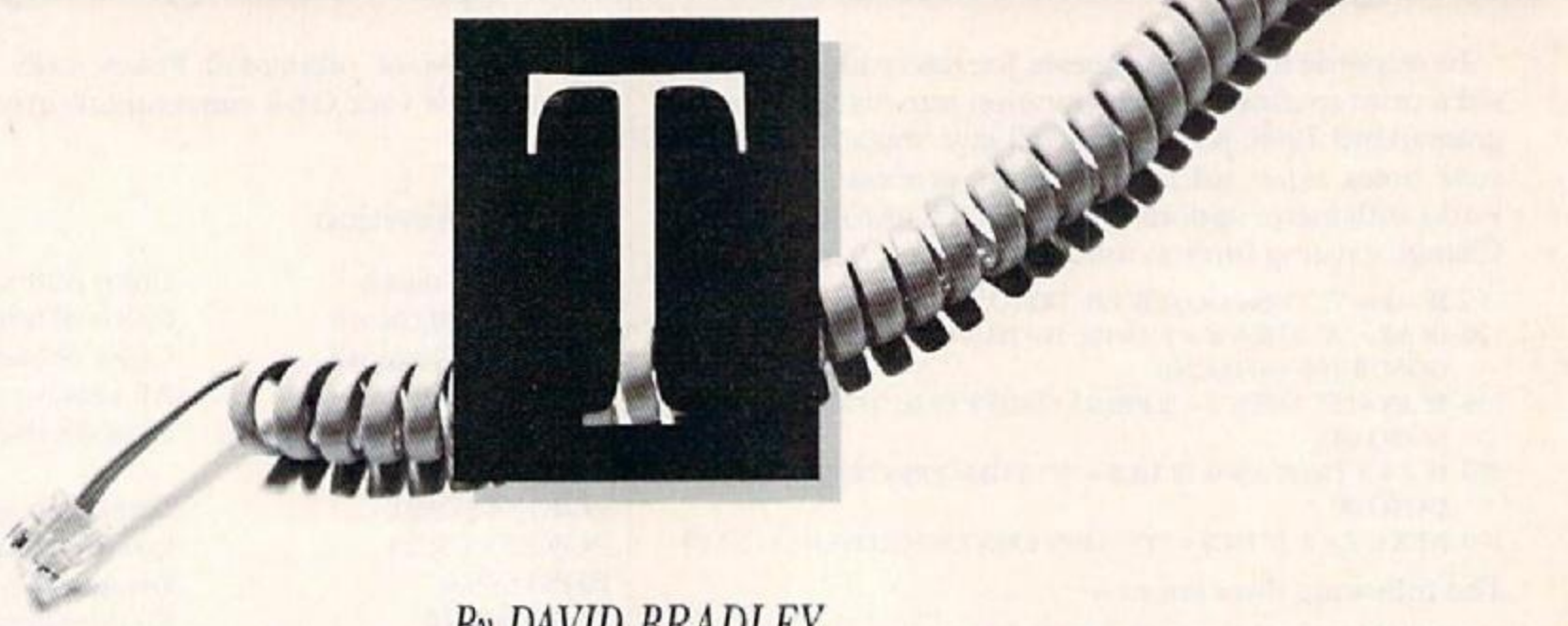

By DAVID BRADLEY

Telecomputing Workshop is a monthly column dedicated to the needs of RUN *readers who are using, or intend to use, a Commodore computer for telecommunications. We invite you to submit your questions or comments to:*

David Bradley
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c/o RUN *magazine*
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Peterborough, NH 03458

I'll begin this month's Telecomputing Workshop with some updated answers to questions in the June column. Edward Basner asked in that issue if the beep generated by the call-waiting service on his phone would interfere with receiving data over his modem. We told him yes, it probably would cause some garbled characters and might even disconnect him from the system. We recommended that he either discontinue the call-waiting or have another phone line installed.

Since then we've received letters from writers in ten states in response to our answer. All the letters tell of the same quick and easy way to temporarily disable call-waiting. Here's how to do it.

Before you make your call, dial 1170. (On a touch-tone phone, *70 will work as well.) Once you've done that, you'll hear the dial tone again. Now you've disabled call-waiting. When you've finished your call and hang up, call-waiting will return automatically.

If your terminal program will support it, you can easily add this number to your phone list and have your auto-dialer disable the call-waiting every time it dials. If possible, you should put a pause between the 1170 and the BBS number. Cindy Jones of Bakersfield, California, says two seconds does the trick for her.

Since the letters with this solution came from many localities across the United States, I assume this service is widely available. However, it may not be offered everywhere, so check with your local telephone company. As far as I know, it's free of charge to customers who have call-waiting. The service is *not* offered in Canada.

If you're Canadian, or the service doesn't exist in your area but you do have call-forwarding, you can avoid the call-waiting beep by forwarding calls to another number during your on-line time. The other alternatives are the two mentioned in June: have call-waiting removed or get another phone line.

In the June column we also published a letter from Leonora Crain, who was having constant trouble with garbled messages. She wanted to know if the cause was more likely her modem or the phone line. We guessed the modem, but suggested that she borrow a friend's to see if that would work better, before she went out to buy a new one.

Since then, Marsha Allen, from Bay Shore, New York, has written to suggest that Leonora's trouble might be similar in origin to the problem she had when she first got a modem. After she'd tried changing modems and programs, a friend suggested that if she got a rotary phone, the trouble might go away. She did, and it did!

Now on to this month's questions.

I recently purchased Commodore's new 1670 1200-baud modem, which comes bundled with a software package called Common Sense. Common Sense supports the Xmodem and B protocols, but doesn't support Punter, the most popular protocol used on various BBS's in my area.

Can you recommend any terminal packages (either commercial or public domain) that support the Punter system and can do the following:
—Upload and download programs.
—Support dual bauds.
—Support dual disk drives using the IEEE bus.
—Provide a text buffer with editing capabilities.
—Provide a macro-key definition mode and auto-dialing of a phone table.

Al Willen
Riverdale, NY

At present I'm unaware of a terminal program that does everything you've listed with the Commodore 1670 modem and a C-64 computer (or a 128 in 64 mode). However, there is one that comes close—a public domain program called Thirdterm.

Thirdterm is new, but should soon be available from your local user's group, BBS, computer store or national on-line network. If you have trouble finding it, write me, and I'll try to locate a source for you.

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GUARANTEED SOFTWARE

VIZASTAR for the C128

Vizastar, the integrated spreadsheet, database and graphics program that has the Commodore 64 world raving, is now available for the C128. It boasts 80 columns, and has over 40K of free memory in the spreadsheet. Those who already own Vizastar 64 will be pleased to know that your existing files can be read by Vizastar 128. Also, you can upgrade to the 128 version. Call us for details and pricing.

"The only other comparable product would be Lotus 1-2-3 for the IBM PC; nothing in the C64 world comes even close to the features of Vizastar."

AHOY July 85

"I found Vizastar would do anything Lotus 1-2-3 could, and then some. It's my Commodore choice to become the standard against which the others will be judged."

INFO 64 Magazine, Issue #7

"Vizastar is an exceptional package that rivals the features of programs such as Lotus 1-2-3 and offers C64 owners the kind of integrated software previously only available for higher-priced systems."

RUN Magazine, June 1985

"I scrutinized, tested and experimented with Vizastar extensively, but could find no weaknesses whatsoever. It is the most comprehensive, most flexible, most powerful and easiest to use integrated software package I've worked with."

Commodore Microcomputer, Sept/Oct 1985

"I use an IBM PC at work with Lotus 123. I feel Vizastar is just as good and in someways better than 1-2-3."

Steven Roberson, NC. End User

"I have used Multiplan and Superbase; both are good pieces of software, but are inadequate when compared to Vizastar."

Jim Mathews, WA. End User

"So good, I bought a second C64 and Vizastar for my office. A wild bargain! You've saved me from having to buy IBM and Lotus."

Philip Ressler, MA. End User

VIZAWRITE CLASSIC for C128

This is the new word processor from Vizastar's author, Kelvin Lacy and is the successor to Omniwriter, which he also wrote. All the features of Omniwriter are there, plus many significant enhancements, like auto pagination, on-line help, pull-down menus, full-function calculator and more. Up to 8 'newspaper-style' variable-width columns can help with newsletters.

Three different proportionally-spaced "near letter quality" fonts are also built-in for use with Commodore or Epson compatible printers. You can merge almost any other word processor file directly into Vizawrite, including Paper Clip and Omniwriter. Naturally, it is also compatible with Vizastar. At all times, what you see on the screen is exactly the way it will be printed out. Vizawrite can do mail-merges and has an integrated 30,000 word spelling checker that you can expand yourself.

PROGRAM SPECIFICATIONS

Both Vizawrite and Vizastar are written in 100% machine language and run in the 128's FAST mode, making it lightning fast. They require a C128 with 80 column color or monochrome monitor. Both come with a cartridge, a diskette, and a reference manual. Vizastar also includes a 50 page tutorial book. Both work with 1541 or 1571 disk drives.

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Telecomputing Workshop

Is there any way I can use my modem while another person in my family is talking on the phone? What will happen if I'm using my modem and someone else picks up the phone?

Jason Meisel
Spring Valley, NY

There's no way you can use your modem while another person at your house talks on the phone. If someone picks up the phone while you're on-line, you'll probably get some garbled characters and you might be cut off from the system.

This is because the second phone draws additional power that may make your signal weaker. It's like when you're talking on the phone and someone at the other end picks up an extension. The voice of the person you're talking to will probably sound fainter. The volume with which the person who picks up the phone speaks into it will also have an effect, and if that person starts to dial a number, you'll probably get disconnected.

Two months ago I sent in a subscription card to Viewtron. A month later, not having heard anything from them, I telephoned. The answering service said Viewtron was going out of business. Yet, in the May 1986 Telecomputing Workshop, a reader asked a question regarding software required for Viewtron.

I just purchased a modem for my C-64 and have not yet signed up with an information service. I would like to subscribe to Viewtron. Is the firm still in business and accepting subscriptions?

Wayne Willmore
West Franklin, IL

Viewtron is out of business, so it should be scratched off your list of potential on-line information services. You can always try Delphi, QuantumLink or CompuServe.

However, before joining such a system, I'd track down some local bulletin boards to practice on until you're comfortable with your new modem. Better to make your mistakes on local systems than when you're paying for on-line time!

What books are available that list bulletin-board phone numbers?

Stephen Wilton
Port Hope, Ontario
Canada

I've heard of some publications that try to keep track of BBS numbers all across the United States and North America, but many numbers are outdated by the time they're printed. Either some BBSs don't survive very long, or they change phone numbers and SYSOPs. However, on the local level there are many small publications that list BBS numbers. In Toronto, a free monthly newspaper called *Toronto Computes!* lists them, and I'm sure there are others all over the continent.

If you want to get a list of local BBS numbers, look in computer stores, ask at your local user-group meeting or check the bulletin sections of some BBSs. They usually have a list of other BBS numbers available for their users to read.

Is there a public domain program available that will allow me to transfer relative files? CompuServe does not do it, but I need to transfer a Data Manager II data disk twice a month through my personal file area of CompuServe.

Will Corley
Sacramento, CA

A couple of years ago, David Williams of Toronto wrote a program designed to take care of problems just like yours. The program, called REL-SEQ CONV.Z, takes a relative file and converts it into a sequential file. CompuServe can upload that with no trouble. Once the file has been downloaded at the other end, the same program will convert it back to a relative file.

I've used this program on the C-64 and a number of other machines. Since it uses no machine-specific routines, it should work on the C-128 as well. You can get the program on TPUG (Toronto Pet Users Group) disk (C)U4, but it also should be available from your local user's group.

What damage can be done to my modem and computer, and other gear attached to them, by a large power surge on the phone line, such as from lightning or a heavy static build-up during a storm? Does it make any difference if the modem is in use at the time or just plugged in? If there is an electrical storm in the area, is it a good idea to unplug the phone line from the modem?

Also, I am a ham radio operator and have static discharge traps on my antenna lines. Is there such an item available for phone lines? And can a storm in the place I am connected to by long distance cause me any problems?

Richard Miller
Visalia, CA

I've talked to a couple of experts about your first question. It's their opinion that no damage *should* occur during a thunderstorm if the phone line is properly installed and protected. However, I've had a modem get zapped during a thunderstorm, and so has a friend of mine. My modem was in use at the time of the damage; the other fellow's was not.

Whenever there's an electrical storm in my area, I always unplug my modems. Although they should be safe during such an event, it makes me feel better. You certainly won't do any harm by unplugging yours, and you might save yourself a repair bill or the cost of replacing the unit.

While I've never heard of an electrical surge passing beyond a modem to damage a computer, by unplugging the modem you certainly eliminate any chance of that happening. Of course, during a storm you also should unplug your computer system from the wall.

I have heard of protection devices for phone lines, but by deadline time I haven't been able to track any down. I hope to have more news on this next month.

An electrical storm in the area of a system you are connected with by long distance may cause some problems in the form of line noise, and there's always a chance the noise will be bad enough to disconnect you. However, there's no way an electrical surge at the other end can make it

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down the lines, through the switching stations and into your modem.

Are there any bulletin board programs on the market that will work with an RS-232-type modem that I have connected to my C-64 system?

Peter Kruml
Puyallup, WA

I can't answer your question with a definite yes or no, but I'll do the best I can. Yes, there are BBS programs for the C-64 that will allow you to use an RS-232 modem. The reason I can't say whether any of them will work with *your* modem is that I know nothing about your modem except that it uses an RS-232 interface.

I have a couple of RS-232 modems kicking around my computer dungeon. One of them is a Hayes 1200, the other is an acoustic type, where you put the telephone handset into cups on the top. The Hayes will work with a BBS program, because it'll answer the phone and do all the other things necessary to run such a system. The acoustic modem has no auto-answer mechanism, so there's no way to have it run a BBS without major modifications and additions. Yet both are RS-232 modems.

In the future, be sure to include all relevant information when you're asking a question about your computer system. The smallest detail may be of vital importance and may make the difference between getting an answer, a baffled look or no response at all.

I have an automatic modem with a terminal program in it. The program supposedly provides for changing the baud rate to 50, 75, 150, 300, 600, 1200 and 2400, but when I change it to 1200 or 2400, it doesn't work. When I tried to call Quantum-Link on 2400 to find out more about it, I got through, but didn't get anything on the screen.

Nathan Boyd
Westlake, LA

Judging from the information you provided in your letter, the only answer I can come up with is that you have a 300-baud modem. Your terminal program can change the baud rate and your computer will go along with that, but you must also have a modem that will support the higher speed.

Many terminal and BBS programs allow you to move the baud rate up a bit while you're on-line, and most 300-baud modems can be coaxed into working a bit faster, but there's no way you can convince a 300-baud modem to handle 1200 or 2400 baud.

I can get my Commodore 1650 modem to work at 450 baud, and it will handle that rate almost all the time. The only problem I have from the increased speed is a few garbled characters every now and then. R

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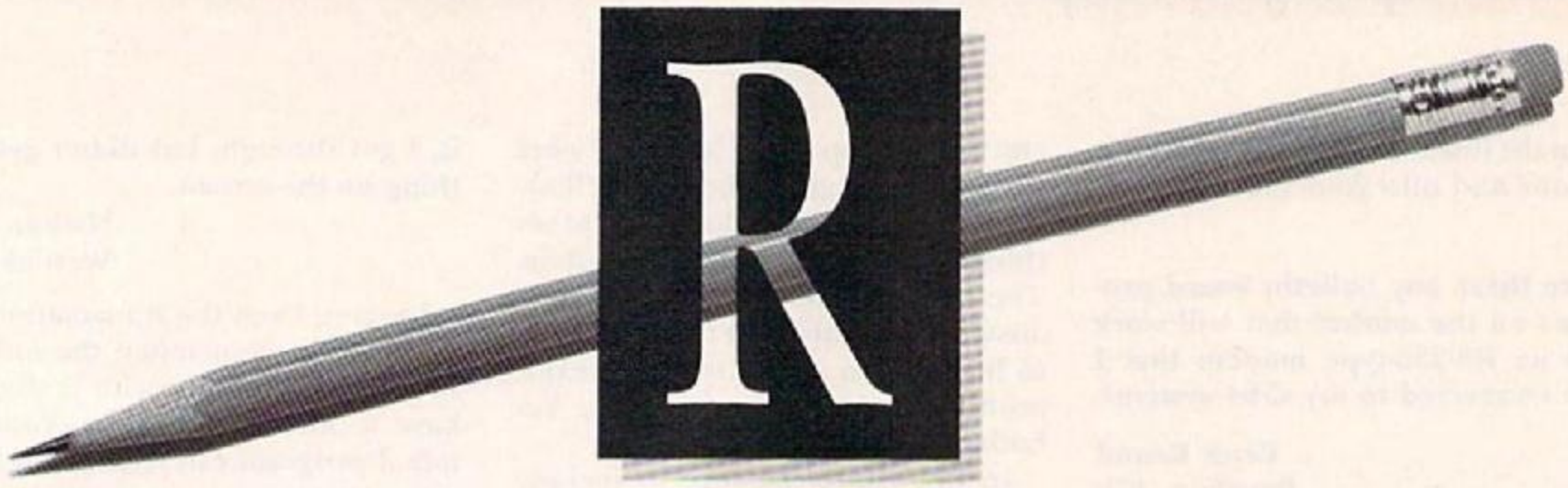


By MARGARET MORABITO

Underwater ecology, a talking teacher, a certificate printer and an idea book highlight this month's Resource Center smorgasbord.

There are still new developments in educational software for Commodore owners, despite the slowing trend in the industry as a whole. A noteworthy move by Commodore is its decision to package a third-party educational program with each new Commodore 64C.

The first company to join in these efforts, MECC, is well-known in the schools. It's refreshing to see a company like this throwing its support toward the Commodore home computer market.

MECC and Commodore

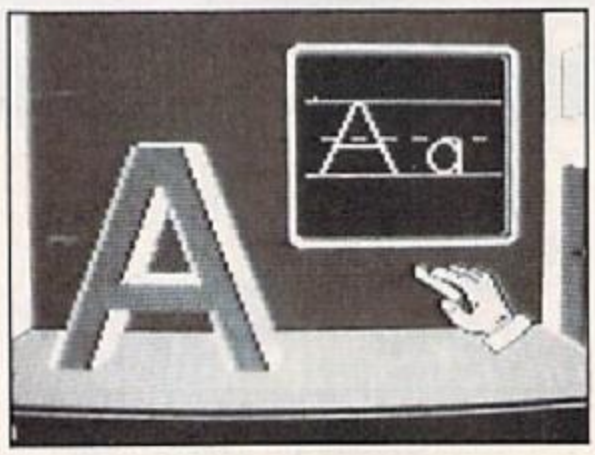
The first MECC program to be bundled with the 64C is called *Odell Lake.* Others will be bundled on a rotating basis. Odell Lake, for ages 8 and up, is a wildlife simulation that teaches survival strategies of creatures in a freshwater lake.

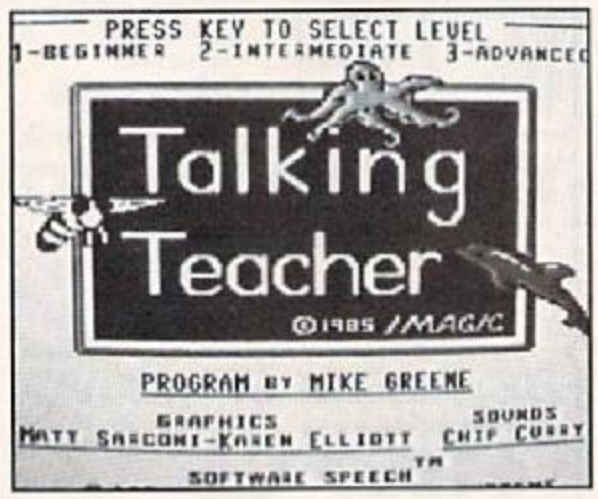
Each student takes on the role of a fish, one of six different kinds. As the fish swims about, it confronts various obstacles and predators. The objective is to make decisions that will enable the fish to survive in its underwater world.

The documentation accompanying the program encourages further study of ecology. It suggests additional topics to be researched, and it provides a chart on which students can record the results of their fish's interaction with other creatures.

There are eight other MECC programs you can buy directly from Commodore for $19 each:

Path Tactics: a basic math skills program for ages 5–12 that provides practice in whole numbers and problem solving.





Spelling Bee: a drill program for ages 8–13 that introduces and provides practice in spelling and vocabulary skills. It follows a fill-in-the-blank format, with three possible answers displayed.

Adventures with Fractions: a program for ages 10–14 that provides practice in placing fractions in order according to size. Both the common denominator and cross-product methods are used.

Expeditions: a simulation for ages 10–15, in which students play the roles of American frontiersmen during three historical periods.

Pre-Reading: a program for ages 3–7 providing practice in reading-readiness skills such as upper- and lower-case letters, alphabetical ordering, problem solving and correspondence of letters and sounds.

The Glass Computer: a simulation for ages 12 to adult that demonstrates the internal workings of a computer. Students get a vivid picture of how a computer functions as it interprets Basic programming statements.

The Friendly Computer: a program intended to teach students of ages 5–8 keyboarding skills, the components of their computer system and how to save to disk.

The Market Place: a program for ages 8–14 that illustrates through graphics the basic concepts of economics. It includes simulations of business ventures in which students make decisions and test their business acumen.

All these programs can be ordered from Commodore at 1200 Wilson Drive, C2655, West Chester, PA 19380.

Talking Teacher

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The printer has a set of rear switches which allow the use of standard ASCII as well as foreign character printwheels. Page length can be set to 8, 11, 12, or 15". The Daisy 1120 can also be switched to add automatic line feed.

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in the States. The company has introduced a new educational program, called Talking Teacher, which I find quite good.

Aimed at pre-schoolers through grade 1, Talking Teacher has remarkable speech synthesis built into its software, alleviating the need for a compatible hardware speech module. It talks to the young student as it provides tutoring and practice in recognizing the letters of the alphabet and learning vocabulary words associated with the letters.

Talking Teacher is uncanny at times. For example, in one mode it shows a classroom with a blackboard on the wall. A hand appears and prints a letter both in upper- and lowercase on the board. Then a voice says the letter sound and asks the child to find the letter on the keyboard and press it.

The speech is clear, with inflections that effectively simulate true human speech. Moreover, as the child tries to locate a letter on the keyboard, the Talking Teacher gives spoken hints along the way. For instance, if the child presses an R instead of a B, the computer says, "Try a little lower." The first time this happened with my 3½-year-old son, he really was perplexed because he wasn't accustomed to our computer "understanding" what he was doing.

Each of Talking Teacher's three learning modes offers colorful graphics and sound as children practice their alphabet and keyboarding skills. This is one program that parents and kids alike will enjoy.

Contact Firebird Licensees, Inc., PO Box 49, Ramsey, NJ 07446, or call 201-934-7373 for more information.

Certificate Maker

Coming on the heels of the huge success of Newsroom, Springboard Software recently announced a new program called Certificate Maker. I saw the Apple II version at the Consumer Electronics Show last June, and was told the Commodore version would be out this fall.

Certificate Maker, which lets you create customized certificates to print out and distribute to award winners, should become an instant hit in schools. It offers over 200 pre-designed award certificates, diplomas, licenses and other documents.

The categories include sports, academic achievement, families, children, religion and business. You select the kind of certificate you want to make, choose a border and type in a customized message in one of several type fonts and sizes. You also provide the details for a signature line and enter the date.

Certificate Maker creates a fine-resolution printout that makes the product usable for serious work. Also included are gold-foil seals and colored stickers to adorn your certificates. Furthermore, you can create a name database file that enables you to automatically print any certificate for all names in your file.

I spoke with John Paulson, Chairman of Springboard Software, about the educational programs from his company. Paulson is a former teacher and has strong opinions about what makes good educational software.

In his view, the underlying goal of educators is to provide their students with access to ideas of others and with the ability to communicate effectively. Springboard's educational programs are designed to achieve this goal by providing compelling incentives.

A program such as Newsroom earns its worth as an educational program by providing an alternate route to learning English. It first gets students interested in making a newspaper; then it stimulates them to craft better sentence structure and paragraph development during the editing process.

Those skills that are drudgery to some students become valued in the context of a project that has a physical end product to be spread among friends and the rest of the school community. Paulson is all for giving students the tools to harness the computer to achieve meaningful, real-world results.

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vironment, as well as provide an easy way to channel creativity. Programs that are easy to use and have printout capabilities, such as Springboard's Newsroom, Certificate Maker and Mask Parade, follow this theme. With hardcopy options, children who have computers can share the results of their activities with friends who don't, giving the computer a more functional social element.

Springboard Software offers a noteworthy product guarantee. If, within a 30-day period, you decide the program isn't really achieving what you had anticipated, you may send it back to Springboard for a full refund.

Contact Springboard Software at 7808 Creekridge Circle, Minneapolis, MN 55435, or call 612-944-3915 for further information.

Grolier's Curriculum Guide

Teachers will be interested in Grolier Electronic Publishing's curriculum guide, which is called *Across the Curriculum*. This 189-page book costs $12 and contains 100 lesson plans for use in the classroom. While it's designed to show teachers how to incorporate the various Grolier educational programs into their classes, I see the guide as useful to teachers who have other brands of educational software.

Across the Curriculum is an idea book. The major subject areas covered are mathematics, language arts, science, special education, social studies and library science. Each lesson plan includes a stated learning objective, appropriate grade levels, how to prepare for the lesson, the actual components of the activity, special notes and instructions for modifying the lesson.

There are also worksheets in the book that you can photocopy for distribution to the class. Answers are provided, and there's a list of resources to consult for additional assistance in your efforts to teach with computers.

This type of support for schools is needed on a larger scale. I'd like to see more educational software companies providing such idea books for parents and teachers.

For more information, contact Grolier Electronic Publishing, Inc., Sherman Turnpike, Danbury, CT 06816, or call 800-858-8858.

Free Educational Program Disk

The Resource Center's readers have been very generous in donating their educational programs to the Center. By mid-June I had already received several dozen programs of high quality, covering a variety of subject areas. This spirit of commitment and sharing is inspiring.

As I mentioned in the June column, these programs will be placed on-line in The Resource Center special-interest group on QuantumLink. In addition, for those of you who aren't on Q-Link, I've collected these programs on a disk you can get for free from me here at *RUN*.

To get The Resource Center Educational Disk, just send me a blank disk and your name and address. I'll make a copy and get it off to you as quickly as I can. R

If you're using Commodore computers for educational purposes (at home or in school) and would like to share your experiences through The Resource Center, write me a letter detailing the equipment you're using, subject areas being taught, grade level or age of your students, software that you are using and any other information you feel like including.

Also, if you'd like to donate public-domain educational programs to The Resource Center for sharing with other educators and parents, please send along a disk with a brief description of the programs. Send correspondence and disks to:

Margaret Morabito
The Resource Center
c/o RUN *Editorial*
80 Pine St.
Peterborough, NH 03458

You can also leave mail in my on-line mail boxes: CompuServe (70616,714) and Q-Link (MARGM).

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From p. 13.

$32A Keeping track of disk commands—If you have a C-128, you now have the problem of remembering two sets of disk commands.

I keep a list of C-64 disk commands on one side of a 5×8 index card and the C-128 list on the other side. Then I prop up the card between my 128's vent panel and monitor stand. Thus, both sets of disk commands are readily visible.

Eric Pickell
Palatine, IL

$32B Copying with RUN Script 64 1.0—Did you know that your copy of RUN Script 64 1.0 can double as a handy machine language code copier? Load and run RUN Script 64 1.0, then insert into your disk drive a disk containing the machine language program to be copied. With the F1 and L keys, load the program file into RUN Script's text area as you would a text file. Now insert another formatted disk into the drive and copy the code to the disk with the F1 and S keys, followed by a filename.

This is a fast and handy method of copying RUN Script ML code and character sets, but be careful—some ML code may save at an improper address and become corrupted. Also, Basic programs cannot be copied this way without extensive modifications.

Tim Walsh
RUN Staff

$32C RUN Script 64 reversed characters—If you have a favorite character set you would like to use with RUN Script 64 1.0, but can't because it lacks reversed characters, here's a fix to get around that problem. First, using the copy method outlined in the above Magic trick, copy the character set(s) you want to use to a disk containing a copy of RUN Script 64 1.0. Next, load and run RUN Script using the standard C-64 character set or any other character set that has reversed characters. Once RUN Script is activated, exit it via the F1 and X keys.

Next, load in the Boot program and change the character set name that resides there to the filename of the preferred character set you saved on the disk. Now run the boot program. Your new character set has replaced the original one. In most instances, you will still retain the first set's reversed characters that are needed for the command bar and printer macros.

Tim Walsh
RUN Staff

$32D Double speed C-64—This trick is of interest to anyone who uses the C-128 in C-64 mode. The program shows how to take advantage of the Fast (2 MHz) mode in your C-64 programs.

```
10 OT=TI:PRINT"{SHFT CLR}DOUBLE SPEED C64 -
    RAMOKOTA REDDY
20 GOTO30: POKE53296,1
30 FORI=1TO924
40 B=I*SIN(I):
50 NEXTI
60 POKE53265,PEEK(53265)OR16:POKE53296,0
65 T=(TI-OT)/60
70 PRINT"{SHFT CLR}TIME=";T:PRINTTAB(17)"{C
   RSR UP}SECONDS
```

After you run it, the program will display that it took nearly 30 seconds to execute. Now, remove the GOTO 30 from line 20 and run it again. The screen will scramble as the program executes in Fast (2 MHz) mode. Once it is reset in line 60 to Slow (1 MHz) mode, the screen will regain its composure and clear itself. The result? The program will tell you it took less than 15 seconds to run. Use this trick when you want to reduce the execution times of Basic and machine language C-64 programs running on the C-128.

Ramakota Reddy
Iowa City, IA

$32E Doing 128 Loop-Do-Loops—The C-128's Basic 7.0's Do While and Loop While commands can be used in the same Do...Loop. This simplifies some difficult programming tasks. The following program illustrates this with the Shell binary sort:

```
10 PRINT"{SHFT CLR}DO WHILE, LOOP WHILE, DO
   ..LOOP - FRED RANSOM
20 DIMA$(500):NO=-1:DO:NO=NO+1:PRINT"ENTER
   CHARACTERS, * WHEN FINISHED":{2 SPACEs}I
   NPUT A$(NO):LOOP UNTIL A$(NO)="*":NO=NO-
   1:PRINT"NUMBER OF ENTRIES = ";NO+1
30 REM SORT
40 PRINT"START SORT: ";TI$:X=TI:D=NO:DO:D=I
   NT(D/2):PRINTD,:FORK=D TO2*D-1:FORI=K TO
    NOSTEPD:J=I:T$=A$(J):DO WHILE A$(J-D)>T
   $:A$(J)=A$(J-D):J=J-D:LOOP WHILE J>=D
50 A$(J)=T$:NEXT:NEXT:LOOP WHILE D>1:Y=TI:P
   RINT"{2 CRSR DNs}COMPLETED: "TI$:PRINT"T
   OTAL TIME: ";(Y-X)/60;"SECONDS": FOR I=1
   TONO:PRINTA$(I),:NEXT:END
```

Fred Ransom
Oxnard, CA

$32F Input control—Inputting commas or colons necessary in Input statements results in an Extra Ignored error and the loss of the punctuation marks and any data following them. Here's a short routine to put them, along with the data following, into Input statements. The secret is to begin the input with a quotation mark that will validate the use of commas and colons within input data. The following program makes the beginning quotation mark the same color as the background, thereby making the input prompt appear normal.

```
10 REM INPUT CONTROL - NICK PECK
20 CC=PEEK(646):OPEN3,3:CMD3:
21 PRINT"ENTER YOUR AGE, NAME (LAST,FIRST)
   OR '*'TO EXIT";
25 POKE631,29:POKE198,1
30 POKE646,PEEK(53281):PRINTCHR$(34);:POKE2
   12,0:PRINT"{CRSR LF}";
```

→

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Listing continued.

```
40 POKE646,CC:INPUTA$:IF A$="*"THEN SYS 204
   8
45 PRINT#3:PRINT"{2 CRSR DNs}"A$:CLOSE3
50 GOTO 20
```

Nick Peck
Sherwood, OR

$330 C-128 Lo-Res screen dump—Use this subroutine to create hard copies of screen displays. It works in both 40- and 80-column modes—it even does windows!

```
10 REM C128 SCREEN DUMP - MIKE TRANCHEMONTA
   GNE
20 OPEN3,3:OPEN4,4,7,CHR$(13):PRINTCHR$(19)
   ;
30 FOR Y=0TORWINDOW(0)
40 IF RWINDOW(2)=40THENPRINT#4,CHR$(14);
50 FORX=0TORWINDOW(1)
60 GET#3,A$:A=ASC(A$)
70 IF(AAND127)>31THENPRINT#4,A$;
80 NEXTX:PRINT#4,CHR$(13)
90 NEXTY:CLOSE3:CLOSE4
```

Mike Tranchemontagne
Nashua, NH

$331 C-128 Hi-res screen dump—This C-128 40-column mode program, like some housekeepers, doesn't do windows. However, it does perform accurate screen dumps of both standard and multicolor bit-map screens.

```
100 REM C-128 HIRES SCREEN DUMP - JERRY JAR
    VIS
115 IFRGR(X)>2THEN MODE=159:ELSE MODE=319
120 OPEN3,4:FORY=0 TO 199STEP 7
130 PRINT#3,CHR$(15);SPC(10);CHR$(8);
140 FORX=0 TO MODE:CH=0:FORM=0TO6
150 LOCATE X,Y+M:IF RDOT(2)>0THENCH=CH+2{UP
     ARROW}M
155 NEXT
160 CH=CH OR 128:A$=A$+CHR$(CH):PRINT#3,A$;
    :A$="":NEXTX
170 PRINT#3,CHR$(8):NEXTY:CLOSE3:END
```

Jerry Jarvis
Spokane, WA

$332 C-64 wedge and the Auto Menu program—Here's a fast and simple way to use the Auto Menu program (see *RUN*, April 1986) with the C-64 wedge. First, copy the DOS 5.1 program onto the disk containing the Auto Menu program. Then add these lines to the program:

```
8 IFA=0THENA=1:LOAD"DOS 5.1",8,1
9 IFA=1THENSYS12*4096+12*256
```

The Auto Menu program will first load the C-64 wedge, then begin working normally. The C-64 wedge commands are now available, and the Auto Menu program can be used over again by typing "/ AUTO MENU" and RUN.

Richard Reisig
Mitchell, NE

Compiled by RUN *staff members Harold R. Bjornsen, Margaret Morabito and Tim Walsh*

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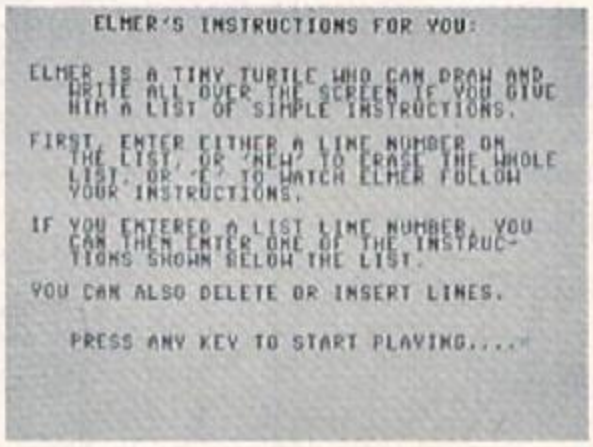
From p. 48.

Listing 1 continued.

```
34 B$="{SHFT CLR}{CTRL 1}{5 SPAC
   Es}ELMER'S INSTRUCTIONS FOR Y
   OU:{CTRL 3}"              :REM*42
36 TL=1:GOSUB 295Ø:PRINT "{CRSR
   LF} {CRSR LF}{2 CRSR DNs}";A$
   ;                         :REM*246
38 FOR A=1 TO LEN(B$)-3:PRINT "{
   CRSR LF} {2 CRSR LFs}*";:GOSU
   B 275Ø:NEXT A             :REM*232
4Ø READ B$:IF B$="END" THEN 6Ø
                             :REM*128
42 PRINT "{CRSR LF} {CRSR LF}{CR
   SR DN}";A$;:GOSUB 295Ø:REM*14
44 READ B$:IF B$="END" THEN 6Ø
                             :REM*132
46 PRINT "{CRSR LF} {CRSR LF}{CR
   SR DN}";A$;:A=LEN(B$):FOR C=1
    TO A                     :REM*166
48 PRINT "{CRSR LF}";MID$(B$,A-C
   +1,1)"{2 CRSR LFs}";A$;
                             :REM*88
5Ø GOSUB 275Ø:NEXT C:GOTO 4Ø
                             :REM*196
6Ø TL=4Ø                     :REM*174
62 GET B$:IF B$<>"" THEN 1ØØ
                             :REM*114
64 PRINT "{CRSR LF} ";:GOSUB 275
   Ø                         :REM*238
66 PRINT "{CRSR LF}";A$;:GOSUB 2
   75Ø:GOTO 62               :REM*92
1ØØ :                        :REM*76
14Ø REM VARIABLES            :REM*86
17Ø READ B$:IF B$="END"THENBL=B:
   GOTO2ØØ                   :REM*2Ø4
18Ø B=B+1:B$(B)=B$:B(B)=LEN(B$)
                             :REM*136
19Ø READ C(B):GOTO 17Ø       :REM*114
2ØØ S$="{13 SPACEs}"         :REM*178
21Ø ER$="{CRSR UP}"+S$+S$+S$+"{C
   RSR UP}"                  :REM*116
22Ø TL=5Ø:AL=36:D=54272:U=1Ø
                             :REM*176
699 :                        :REM*165
7ØØ REM ....RESTART ADDRESS
                              :REM*4
71Ø :                        :REM*176
73Ø REM STATEMENT LIST DISPLAY
                             :REM*98
735 POKE 5328Ø,3:POKE 53281,3:PO
   KE 646,6                  :REM*75
74Ø PRINT "{SHFT CLR}";:N=18:FOR
    O=1 TO 18                :REM*6
75Ø PRINT "{CTRL 3}";RIGHT$(STR$
   (O),2);". ";              :REM*232
76Ø PRINT "{CTRL 7}";A$(O);TAB(2
   Ø);                       :REM*126
77Ø PRINT "{CTRL 3}";RIGHT$(STR$
   (O+N),2);". ";            :REM*99
78Ø PRINT "{CTRL 7}";A$(O+N):NEX
   T O:PRINT                 :REM*55
79Ø IF Q=1 THEN 98Ø          :REM*65
8ØØ :                        :REM*11
81Ø REM LINE # INPUT         :REM*39
83Ø INPUT "LINE #, 'E' OR 'NEW'"
   ;I$                       :REM*29
84Ø PRINT ER$:IF I$="E" THEN 161
   Ø                         :REM*185
85Ø IF I$<>"NEW" THEN 87Ø
                             :REM*179
86Ø FOR A=1 TO 36:A$(A)="":NEXT:
   GOTO71Ø                   :REM*115
87Ø I=LEN(I$):IF I<1 OR I>3 THEN
    94Ø                      :REM*221
88Ø IF I$="Ø" THEN 94Ø       :REM*31
89Ø N=ASC(I$):IF N<49 OR N>57 TH
   EN 94Ø                    :REM*2Ø9
9ØØ N=ASC(RIGHT$(I$,1))      :REM*211
91Ø IF N<49 AND N>57 THEN 94Ø
                             :REM*33
92Ø A=VAL(I$)                :REM*39
93Ø IF A>Ø AND A=<AL THEN 98Ø
                             :REM*213
94Ø GOSUB 25ØØ:IF U=Ø THEN 81Ø
                             :REM*99
95Ø PRINT "{SHFT CLR}{4 CRSR DNs
   }"                        :REM*175
96Ø GOTO 71Ø                 :REM*189
97Ø :                        :REM*181
98Ø REM STATEMENT DISPLAY:REM*39
1ØØØ Q=1:PRINT "{CRSR UP}{CTRL 2
   }";                       :REM*153
1Ø1Ø FOR M=1 TO 3:FOR N=Ø TO 3
                             :REM*237
1Ø2Ø B=M+N*3:IF B>BL THEN 1Ø4Ø
                             :REM*2Ø3
1Ø3Ø PRINT TAB(N*1Ø);B$(B);
                             :REM*234
```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CAN THEN ENTER ONE OF THE INSTRUC-
TIONS SHOWN BELOW THE LIST.
YOU CAN ALSO DELETE OR INSERT LINES.
PRESS ANY KEY TO START PLAYING....

```
1Ø4Ø NEXT N:PRINT:NEXT M:REM*134
1Ø5Ø PRINT "{CTRL 2}I{CTRL 8}NSE
   RT{4 SPACEs}{CTRL 2}D{CTRL
   8}ELETE{4 SPACEs}";:REM*138
1Ø6Ø PRINT "{CTRL 2}B{CTRL 8}ACK
    TO LINE #{CRSR DN}"
                             :REM*244
1Ø7Ø :                        :REM*26
1Ø8Ø REM STATEMENT INPUT     :REM*94
11ØØ PRINT "{CTRL 7}LINE";A;:I$=
   "":INPUT I$               :REM*122
111Ø PRINT ER$:IF I$="" THEN GOS
   UB 25ØØ:GOTO 1Ø7Ø         :REM*168
112Ø IF I$="I" THEN 154Ø:REM*2Ø2
113Ø IF I$="D" THEN 158Ø:REM*146
114Ø IF I$="B" THEN Q=Ø:GOTO 71Ø
                             :REM*92
115Ø :                       :REM*1Ø6
116Ø REM IS 'I$' VALID?      :REM*186
118Ø B=Ø:I=LEN(I$)           :REM*38
119Ø B=B+1:IF B>BL THEN GOSUB 25
   ØØ:GOTO 1Ø7Ø              :REM*1Ø
12ØØ IF LEFT$(I$,B(B))<>B$(B) TH
   EN 119Ø                   :REM*24Ø
121Ø REM ....STMT #C         :REM*218
122Ø C=C(B):IF C>Ø THEN 126Ø
                             :REM*172
123Ø REM ....STMT TYPE Ø     :REM*76
124Ø IF I$=B$(B) THEN A$(A)=I$:Q
   =Ø:GOTO 71Ø               :REM*128
125Ø GOTO 137Ø               :REM*188
126Ø M$=RIGHT$(I$,I-B(B))
                             :REM*212
127Ø GOSUB 259Ø              :REM*74
128Ø J$=M$:J=LEN(J$):IF C>1 THEN
    142Ø                     :REM*59
129Ø REM ....STMT TYPE 1     :REM*9
13ØØ IF J=Ø OR J>2 THEN 137Ø
                             :REM*129
131Ø N=ASC(LEFT$(J$,1))      :REM*47
132Ø IF N<48 OR N>57 THEN 137Ø
                             :REM*1Ø9
133Ø N=ASC(RIGHT$(J$,1)):REM*131
134Ø IF N<48 OR N>57 THEN 137Ø
                             :REM*129
135Ø N=VAL(J$):IF B=8 AND N<16 T
   HEN 146Ø                  :REM*179
136Ø IF B<>8 AND N>Ø THEN 146Ø
                             :REM*221
137Ø GOSUB 25ØØ:GOTO 1Ø7Ø:REM*21
142Ø IF C>2 THEN 148Ø        :REM*33
143Ø REM ....STMT TYPE 2     :REM*23
144Ø IF J<>1 THEN 137Ø       :REM*173
145Ø N=ASC(J$):IF N<33 OR N>95 T
   HEN 14ØØ                  :REM*2Ø7
146Ø REM ....I$ IS VALID STATEME
   NT                        :REM*121
147Ø A$(A)=B$(B)+" "+J$:Q=Ø:GOTO
    71Ø                      :REM*3
148Ø IF C>3 THEN 137Ø        :REM*123
149Ø REM ....STMT TYPE 3:REM*211
15ØØ IF MID$(I$,5,1)=" " THEN 15
   2Ø                        :REM*2Ø3
151Ø I$=LEFT$(I$,4)+" "+MID$(I$,
   5)                        :REM*153
152Ø N=LEN(I$):IF N<6 OR N>15 TH
   EN 137Ø                   :REM*133
153Ø A$(A)=I$:Q=Ø:GOTO 71Ø
                             :REM*87
154Ø REM ....INSERT BLANK LINE
                             :REM*92
155Ø FOR M=35 TO A STEP -1
                             :REM*132
156Ø A$(M+1)=A$(M):NEXT M:REM*28
157Ø A$(A)="":Q=Ø:GOTO 71Ø
                             :REM*84
158Ø REM ....DELETE LINE:REM*1Ø8
159Ø IF A=36 THEN 16ØØ       :REM*72
1595 FOR M=A TO 35:A$(M)=A$(M+1)
   :NEXT                     :REM*185
16ØØ A$(36)="":Q=Ø:GOTO 71Ø
                             :REM*156
161Ø :                       :REM*56
162Ø REM BEGIN EXECUTION:REM*174
164Ø X=1:Y=1:REM{4 SPACEs}INITIA
   L POSITION                :REM*4
165Ø E=2:REM{8 SPACEs}INITIAL PE
   N POSITION                :REM*2Ø
166Ø H$="*":REM{5 SPACEs}INITIAL
    CHARACTER                :REM*4
167Ø L=6:REM{8 SPACEs}INITIAL CO
   LOR #                     :REM*1Ø4
168Ø POKE 5328Ø,5:REM{2 SPACEs}B
   ORDER COLOR               :REM*176
169Ø PRINT "{SHFT CLR}":GOSUB 27
   7Ø:GOSUB 271Ø             :REM*248
17ØØ REM ....STATEMENT LIST
                             :REM*146
171Ø FOR A=1 TO AL:A$=A$(A)
                             :REM*2Ø6
172Ø IF A$="" THEN 233Ø      :REM*158
173Ø B=Ø                     :REM*1Ø8
174Ø B=B+1                   :REM*56
175Ø IF LEFT$(A$,B(B))<>B$(B) TH
   EN 174Ø                   :REM*22
176Ø ON B GOTO 178Ø,185Ø,192Ø,19
   9Ø,2Ø6Ø,21ØØ,213Ø,217Ø,221Ø
   ,229Ø                     :REM*12
177Ø :                       :REM*216
178Ø REM ....RIGHT           :REM*164
179Ø M$=RIGHT$(A$,LEN(A$)-B(B))
                             :REM*1Ø6
18ØØ GOSUB 259Ø:M=VAL(M$):REM*45
181Ø FOR N=1 TO M:GOSUB 237Ø
                             :REM*229
182Ø X=X+1:IF X=41 THEN X=1
                             :REM*179
183Ø GOSUB 271Ø:NEXT N:GOTO 233Ø
                             :REM*121
184Ø :                       :REM*31
185Ø REM ....UP              :REM*31
186Ø M$=RIGHT$(A$,LEN(A$)-B(B))
                             :REM*177
187Ø GOSUB 259Ø:M=VAL(M$)
                             :REM*115
188Ø FOR N=1 TO M:GOSUB 237Ø
                             :REM*43
189Ø Y=Y-1:IF Y=Ø THEN Y=25
                              :REM*7
19ØØ GOSUB 271Ø:NEXT N:GOTO 233Ø
                             :REM*191
191Ø :                       :REM*1Ø1
192Ø REM ....DOWN            :REM*197
193Ø M$=RIGHT$(A$,LEN(A$)-B(B))
                             :REM*247
194Ø GOSUB 259Ø:M=VAL(M$)
                             :REM*185
195Ø FOR N=1 TO M:GOSUB 237Ø
                             :REM*113
```

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Listing 1 continued.

```
196Ø Y=Y+1:IF Y=26 THEN Y=1
                              :REM*213
197Ø GOSUB 271Ø:NEXT N:GOTO 233Ø
                               :REM*5
198Ø :                        :REM*171
199Ø REM ....LEFT             :REM*251
2ØØØ M$=RIGHT$(A$,LEN(A$)-B(B))
                              :REM*61
2Ø1Ø GOSUB 259Ø:M=VAL(M$)
                              :REM*255
2Ø2Ø FOR N=1 TO M:GOSUB 237Ø
                              :REM*183
2Ø3Ø X=X-1:IF X=Ø THEN X=4Ø
                              :REM*87
2Ø4Ø GOSUB 271Ø:NEXT N:GOTO 233Ø
                              :REM*75
2Ø5Ø :                        :REM*242
2Ø6Ø REM ....PEN UP           :REM*218
2Ø7Ø IF E=Ø THEN E=1           :REM*72
2Ø8Ø GOTO 233Ø                :REM*134
2Ø9Ø :                         :REM*26
21ØØ REM ....PEN DOWN         :REM*246
211Ø E=Ø:GOTO 233Ø             :REM*2Ø
212Ø :                         :REM*56
213Ø REM ....CHAR             :REM*244
214Ø H$=RIGHT$(A$,1):GOSUB 277Ø
                              :REM*88
215Ø P=983+X+Y*4Ø:POKE P,K
                              :REM*248
2152 GOSUB 275Ø:GOTO 233Ø
                              :REM*212
216Ø :                         :REM*96
217Ø REM ....COLOR            :REM*192
218Ø L=VAL(MID$(A$,6)):P=983+X+Y
     *4Ø                      :REM*84
219Ø POKE P+D,L:GOSUB 275Ø:GOTO
     233Ø                     :REM*68
22ØØ :                        :REM*136
221Ø REM ....TEXT             :REM*Ø
222Ø A$=MID$(A$,6):M=LEN(A$)
                              :REM*1Ø
2225 X=X-1:IF X=Ø THEN X=4Ø
                              :REM*27
223Ø GOSUB 237Ø:J=K:FOR N=1 TO M
                              :REM*222
224Ø H$=MID$(A$,N,1):GOSUB 277Ø
                              :REM*224
225Ø X=X+1:IF X=41 THEN X=1
                              :REM*98
226Ø GOSUB 271Ø:NEXT N        :REM*134
227Ø K=J:F=1:M=1:GOTO 181Ø
                              :REM*164
228Ø :                        :REM*216
229Ø REM ....STOP             :REM*188
23ØØ A$=""                    :REM*36
231Ø GET A$:IF A$="" THEN 231Ø
                              :REM*35
232Ø GOTO 233Ø                :REM*119
233Ø NEXT A:Q=Ø:GOTO 71Ø:REM*129
234Ø :                         :REM*21
235Ø REM SUBROUTINES          :REM*61
236Ø :                         :REM*41
237Ø REM ....ERASE PREVIOUS POIN
     T?                       :REM*255
238Ø IF F=1 THEN F=Ø:RETURN
                              :REM*131
239Ø IF E=1 THEN E=2:RETURN
                               :REM*7
24ØØ IF E=2 THEN POKE P+D,V:POKE
      P,W                     :REM*153
241Ø RETURN                   :REM*173
242Ø :                        :REM*1Ø1
243Ø REM ....INSTRUCTION INPUT
                              :REM*169
244Ø PRINT "{HOME}{22 CRSR DNs}"
                              :REM*179
245Ø PRINT "{CTRL 3}{7 SPACEs}PR
     ESS ANY KEY TO ";        :REM*179
246Ø PRINT "CONTINUE{CTRL 7)":A$
     =""                      :REM*231
247Ø GET A$:IF A$="" THEN 247Ø
                               :REM*9
248Ø PRINT "{SHFT CLR}{3 CRSR DN
     s}":RETURN               :REM*41
249Ø :                        :REM*171
25ØØ REM ....ERROR MESSAGE
                              :REM*249
251Ø PRINT ,"{CTRL 1}I DON'T UND
     ERSTAND THAT"            :REM*167
252Ø GOSUB 256Ø:PRINT ER$
                              :REM*125
253Ø PRINT ,"PLEASE TRY AGAIN{CT
     RL 7}"                   :REM*251
254Ø GOSUB 256Ø:PRINT ER$:RETURN
                               :REM*7
255Ø :                        :REM*231
256Ø REM ....SCREEN MESSAGE DELA
     Y                        :REM*98
257Ø FOR T=1 TO 5ØØ:NEXT T:RETUR
     N                        :REM*144
258Ø :                         :REM*6
259Ø REM ....TRUNCATE M$      :REM*64
26ØØ IF M$="" THEN RETURN
                              :REM*194
261Ø M=ASC(LEFT$(M$,1))       :REM*72
262Ø IF M=32 THEN 264Ø        :REM*192
263Ø IF M<>16Ø THEN 265Ø      :REM*22
264Ø M$=RIGHT$(M$,LEN(M$)-1):GOT
     O 261Ø                   :REM*2Ø
265Ø IF M$="" THEN RETURN
                              :REM*244
266Ø M=ASC(RIGHT$(M$,1)):REM*186
267Ø IF M=32 THEN 269Ø         :REM*6
268Ø IF M<>16Ø THEN RETURN
                              :REM*174
269Ø M$=LEFT$(M$,LEN(M$)-1):GOTO
      265Ø                    :REM*4Ø
27ØØ :                        :REM*126
```

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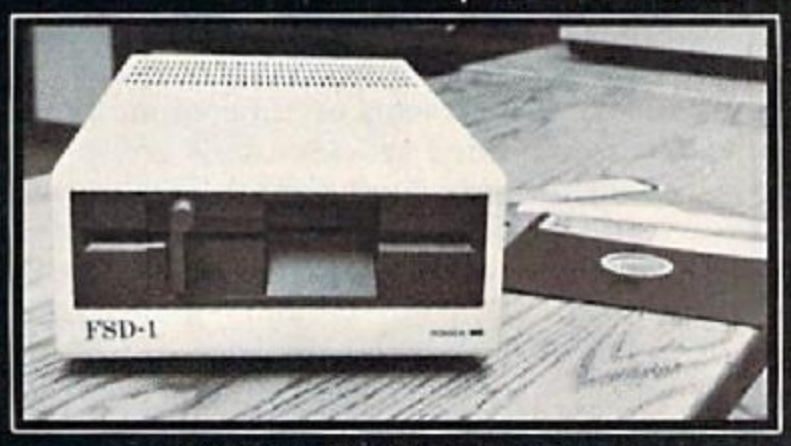

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Listing 1 continued.

```
271Ø REM ....POKE SCREEN CHARACT
     ER                        :REM*23Ø
272Ø P=983+X+Y*4Ø              :REM*4
273Ø V=PEEK(P+D):WL=W:W=PEEK(P)
                               :REM*19Ø
274Ø POKE P+D,L:POKE P,K:REM*196
275Ø FOR T=1 TO TL:NEXT T:RETURN
                               :REM*248
276Ø :                         :REM*186
277Ø REM ....CALC SCREEN DISPLAY
      VALUE                    :REM*128
278Ø H=ASC(H$):IF H<64 THEN K=H:
     RETURN                    :REM*18Ø
279Ø K=H-64:RETURN             :REM*174
28ØØ :                         :REM*226
295Ø FOR C=1 TO LEN(B$)        :REM*149
296Ø PRINT "{CRSR LF}";MID$(B$,C
     ,1);A$;                   :REM*197
297Ø GOSUB 275Ø:NEXT C:RETURN
                               :REM*21
3ØØØ :                         :REM*171
3ØØ2 REM FIXED DATA            :REM*1Ø7
3ØØ4 :                         :REM*175
3ØØ6 REM ....PLAYER INSTRUCTIONS
                               :REM*233
3ØØ8 DATA "{CTRL 1}HI, I'M ELMER
     .","{CTRL 3}I'M A TURTLE.",
     "{CTRL 2}LET'S PLAY A GAME.
     ...."                     :REM*151
3Ø1Ø DATA "ELMER IS A TINY TURTL
     E WHO CAN DRAW AND"       :REM*73
3Ø12 DATA "{2 SPACEs}WRITE ALL O
     VER THE SCREEN IF YOU GIVE"
                               :REM*51
3Ø14 DATA "{3 SPACEs}HIM A LIST
     OF SIMPLE INSTRUCTIONS.{2 S
     PACEs}"                   :REM*69
3Ø16 DATA "{39 SPACEs}"        :REM*3
3Ø18 DATA "FIRST, ENTER EITHER A
      LINE NUMBER ON{3 SPACEs}"
                               :REM*57
3Ø2Ø DATA "{2 SPACEs}THE LIST, O
     R 'NEW' TO ERASE THE WHOLE"
                               :REM*213
3Ø22 DATA "{3 SPACEs}LIST, OR 'E
     ' TO WATCH ELMER FOLLOW{2 S
     PACEs}"                   :REM*51
3Ø24 DATA "{2 SPACEs}YOUR INSTRU
     CTIONS.{19 SPACEs}":REM*1Ø1
3Ø26 DATA "{39 SPACEs}"        :REM*13
3Ø28 DATA "IF YOU ENTERED A LIST
      LINE NUMBER, YOU{2 SPACEs}
     "                         :REM*1Ø7
3Ø3Ø DATA "{4 SPACEs}CAN THEN EN
     TER ONE OF THE INSTRUC- "
                               :REM*127
3Ø32 DATA "{3 SPACEs}TIONS SHOWN
      BELOW THE LIST.{9 SPACEs}"
                               :REM*223
3Ø33 DATA "{39 SPACEs}"        :REM*2Ø
3Ø34 DATA "YOU CAN ALSO DELETE O
     R INSERT LINES.{3 SPACEs}"
                               :REM*1Ø5
3Ø36 DATA "{39 SPACEs}"        :REM*23
3Ø37 DATA "{39 SPACEs}"        :REM*24
3Ø38 DATA "{4 SPACEs}PRESS ANY K
     EY TO START PLAYING...."
                               :REM*2Ø1
3Ø4Ø DATA END                  :REM*143
311Ø :                         :REM*26
312Ø REM ....ELMER INSTRUCTIONS
                               :REM*2Ø
313Ø DATA RIGHT,1,UP,1,DOWN,1,LE
     FT,1                      :REM*218
314Ø DATA PEN UP,Ø,PEN DOWN,Ø,CH
     AR,2                      :REM*134
315Ø DATA COLOR,1,TEXT,3,STOP,Ø
                               :REM*8
316Ø DATA END                  :REM*8
```

end R

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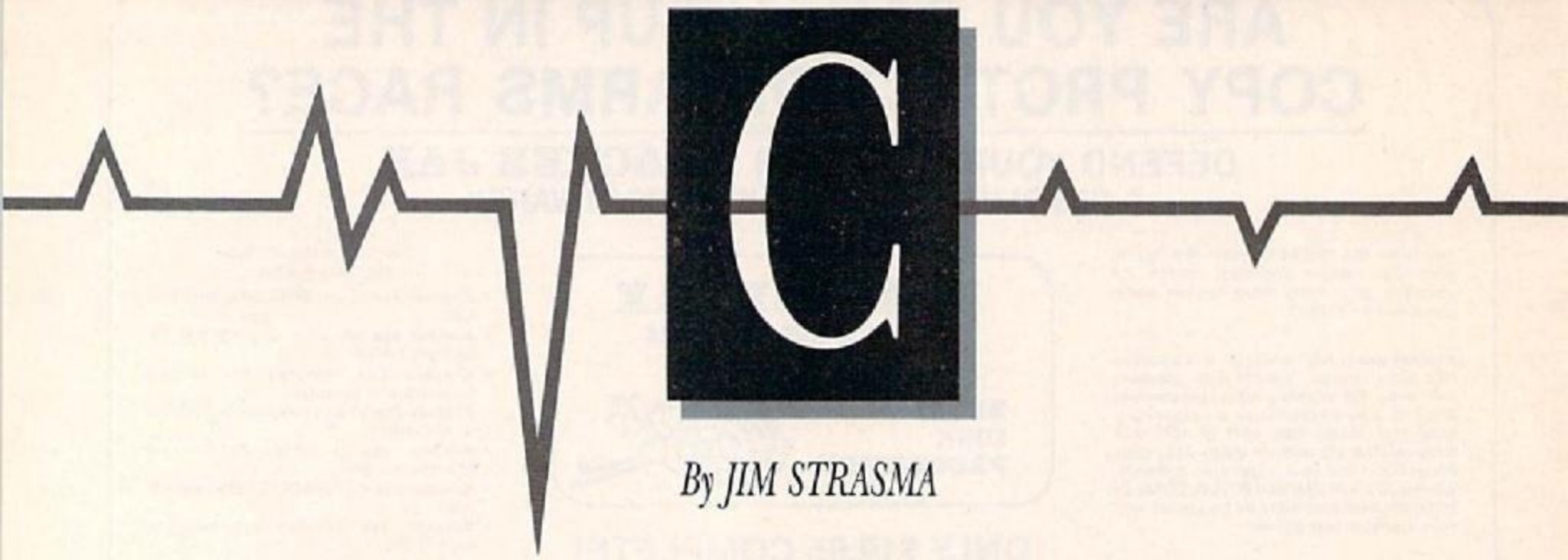

By JIM STRASMA

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Queries are answered only through this column and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

HARDWARE

Q: Can Electronic Arts' Amiga program, Deluxe Paint, be used on the C-128 with a memory expansion module?

T. Phillips
Whiterock, BC
Canada

A: No, because the Amiga uses a machine language different from the two machine languages used in the C-128. It also has support chips different from those in the C-128. Choose a paint program from among the dozens of good ones available for the C-64.

Q: I have a C-64 with a cassette player and an SX-64 with a built-in disk drive and no tape port. Is there a way I can connect my SX-64 to my C-64 to transfer my tape programs to the SX-64 disk drive?

Jeff Hickman
Page, AZ

A: If you can buy or borrow a 6-pin male-to-male DIN cable (i.e., a Commodore serial bus disk drive or printer cable), you're in business.

Simply hook up the cable to the serial bus connector on both computers, and then use the SX-64's disk drive from the C-64. It will behave as if it were a 1541 hooked directly to the C-64 along with the tape unit. Then simply alternate loading from cassette and saving to disk from the C-64, as follows:

```
LOAD"name"
SAVE"0:name",8
```

Q: I bought a VIC-20 last year, and I am a total novice when it comes to computers. I don't want to write programs, so where can I buy software for the VIC?

Also, along with the VIC I bought a 1541 disk drive. Are they compatible?

Russ Hiner
Stone Mountain, GA

A: Toys R Us is one well-known chain that still stocks a good selection of programs for the VIC-20; I'd be glad to hear of others.

As for the 1541, yes, you can use it with the VIC. The hookup and commands are the same for both the VIC and the C-64. If you find the instructions in the manual too difficult, ask a nearby Commodore user group for help. One near you is the Atlanta group, c/o Ronald Lisoski, 1767 Big Valley Lane, in Stone Mountain.

SOFTWARE

Q: I bought Paperback Writer for my C-128. The first problem is that it doesn't justify when my printer is set to proportional spacing. Justification is seen on screen, but not in print.

Second, I have a Spanish proportional-spacing daisywheel printer, the Madeline PS, from Adler.

My word processor has a printer file, which I have adapted to get the special Spanish characters. However, I haven't been able to get all of them at once. If the printer DIP switches 4–6 are set to Spanish, I get all but three characters. If the switches are set to USA, I get those characters, but not two others. Can you help?

Jose Alvarez
Rocheport, MO

A: Most printers have escape codes that can override their switch settings. These are of the form

```
PRINT#4,CHR$(27);CHR$(126);
```

where 126 is the command value you need. The codes can usually be made part of the printer-definition file used by your word processor. Other word processors, such as Easy Script, allow you to hide the needed codes within the text you're writing.

Whichever way you do it, you need an escape sequence that changes character sets from USA to Spanish and back. You can then use the command each time you print a character from the alternate character set, and change sets back again for the next character from the regular set. If your printer can do this, the result will be slow, but workable.

As for true proportional spacing, that requires intimate knowledge of the printer by the word processor. Unless the proportional spacing in Paperback Writer is specifically designed to work with your exact printer model, it will need changes to the printer-definition file—probably lots of them. Those who really need proportional

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spacing usually end up buying whatever printer fits the word processor, or whatever word processor fits the printer (if they can find one).

Q: I recently acquired a C-16 and would like to set it up as a typewriter. The computer's instruction manual says it can be done, but is vague about the equipment required and how to hook it up. Whenever I ask a service center or computer "expert", I get the same answer: "Forget it. The 16 is just a toy." Can something be rigged up to print one page at a time without saving it to disk?

Larry Davidson
Metairie, LA

A: The C-16 is intended to use the same software cartridges as the Plus/4. Therefore, I think you'll find Commodore's Script/Plus word processing cartridge for the Plus/4 will do what you want. You can order Script/Plus and enough other C-16 programs directly from Commodore to make it a visibly useful computer.

You'll also need a printer to copy your page to paper. Since some non-Commodore printer interfaces do not work with the Plus/4, your best bet may be to buy a Commodore printer, such as the DPS-1101.

Q: I recently got Epyx's Fast Load cartridge for my C-64. A friend has one, also. When I tried mine, I got a lot of garbage. When we used his, it was fine. What's wrong?

Jared Shockley
Renton, WA

A: Assuming you used the same C-64 system both times, your Fast Load cartridge is probably defective. This sometimes happens with all products. If possible, take it back to the dealer and swap it for another.

On the other hand, if you didn't use the same C-64 both times, do that first, because it's also possible that there is something wrong with your computer itself instead of the cartridge.

PROGRAMMING

Q: When a program I purchased happened to have the same ID as one of my own programs, I ended up with two disks having the same ID. This could cause a conflict when using RUN*'s Disk Master program ("Disk Master Revisited,"* RUN*, February 1984). Please give me detailed instructions on how I may change the ID of my own disk, so as not to have a conflict.*

Maurice F. Hamblett
Venice, FL

A: The only safe way is by formatting a new disk with the ID you want, and then copying to it all files from the original disk. Any other approach is risky at best. Since copying with a single drive is tedious and not always even possible, your best bet will be to find someone with an MSD dual disk drive or a Commodore 4040 dual disk drive. Then place your original disk in drive 0 and the newly formatted disk in drive 1.

The command to make the copy is:

```
OPEN 15,8,15,"C1=0"
```

After the copy is completed, you may use the new disk in place of your original.

Q: I own a C-128, but most programs published in magazines seem to be written for the C-64. Please tell me how to convert a program for the C-64 into 128 mode.

P. Leyden
Denver, CO

A: The principle for converting C-64 programs into C-128 native mode is the same as for converting them to work on the Plus/4, namely, replace each Poke command with an equivalent added Basic command. To do this, you'll need both your C-128 manual of new commands and a book detailing what all the usual Pokes do on the C-64. For this, I refer to Sheldon Leemon's book, *Mapping the C-64*.

Then, when you have, for example, a POKE 53280,14, you can use the two books to find the equivalent C-128 command, COLOR 4,15.

Q: In many programs, I notice the number 169 appearing frequently in Data statements. Is this a Gosub in machine language? I'm curious to know the basics of machine language contained in Data statements.

Jim Smith
Sterling, KS

A: The number 169 is the decimal representation of the machine language command LDA #. It loads the value in the number following 169 into the primary accumulator of the microprocessor. This is indeed a very common command, and often you will find the next number is 0, meaning that the accumulator contains a zero.

If you're ready to learn more about machine language, one tool I use almost daily is Micro Logic's 6502 reference card. It lists on a single plastic sheet all the reference material I need for 65xx programming, including the answer to your question about what instructions are represented by various numbers. To order, send a check for $6.95, marked "Send (1) MC-6502," to PO Box 174, Hackensack, NJ 07602.

Q: I know nothing about machine language, but, for program security, I'd like to be able to erase a program when it ends or if a system reset is detected. I can't just use New, because some utility programs will resurrect the program afterwards. Could you write a machine language program to do the following:

```
10 FOR X = 2048 TO 32767
20 POKE X,0
30 NEXT
```

and to be executed when called, or on reset?

Glenn Parks
Washington, NJ

A: I could, but I won't, because it would give you a false sense of security and breach my long-standing ban on helping either protectionists or pirates.

You should be aware, however, that anyone who wants access to your program badly enough to use an un-new utility could also attack it with more powerful utilities, some of which, for example, freeze your program at the press of a button, save it to disk, and then resume, all without being detected by your program.

REPAIRS

Q: When I hit the A key, I must apply a sharp tap for it to register. I substituted the keyboard from my VIC-20 and the problem disappeared. Is this a legitimate repair?

John Bagge
Oakland, NJ

http://www.oldgamesitalia.net/

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A: It is, indeed. Commodore was even accused of shipping some C-64's with VIC keyboards, back when parts were hard to come by. But hang on to your C-64 keyboard. You may want to use the individual keys from it for later repairs. It disassembles with a small Phillips screwdriver, and inside you'll find all the inner mechanisms the same, with only the removable keytops differing from key to key. This means you can swap individual keys next time, instead of the whole keyboard.

OTHER

Q: I live in an area with no user groups nearby. What should I do to bring one to Riverdale?

Richard Tieger
452 W. 261st St.
Bronx, NY 10471

A: You've already taken the first step by announcing your interest in forming one. Now other *RUN* readers in your area can contact you about it.

Here are some more suggestions: Choose a convenient time for a first meeting in your home. Then make signs announcing it as an organizational meeting and briefly describe what your user group will do. Ask the Commodore dealers in your area to post copies of your announcement and to mention it to customers, and also send copies to local papers, radio and TV stations. Then, on the appointed night, have some extra chairs and your computer in your living room and some refreshments ready. You also might have an interesting program handy to show, or a disk of public domain programs to give away. [Note: Also see, "How to Begin and Maintain a User's Group," *RUN*, February 1985. Eds.]

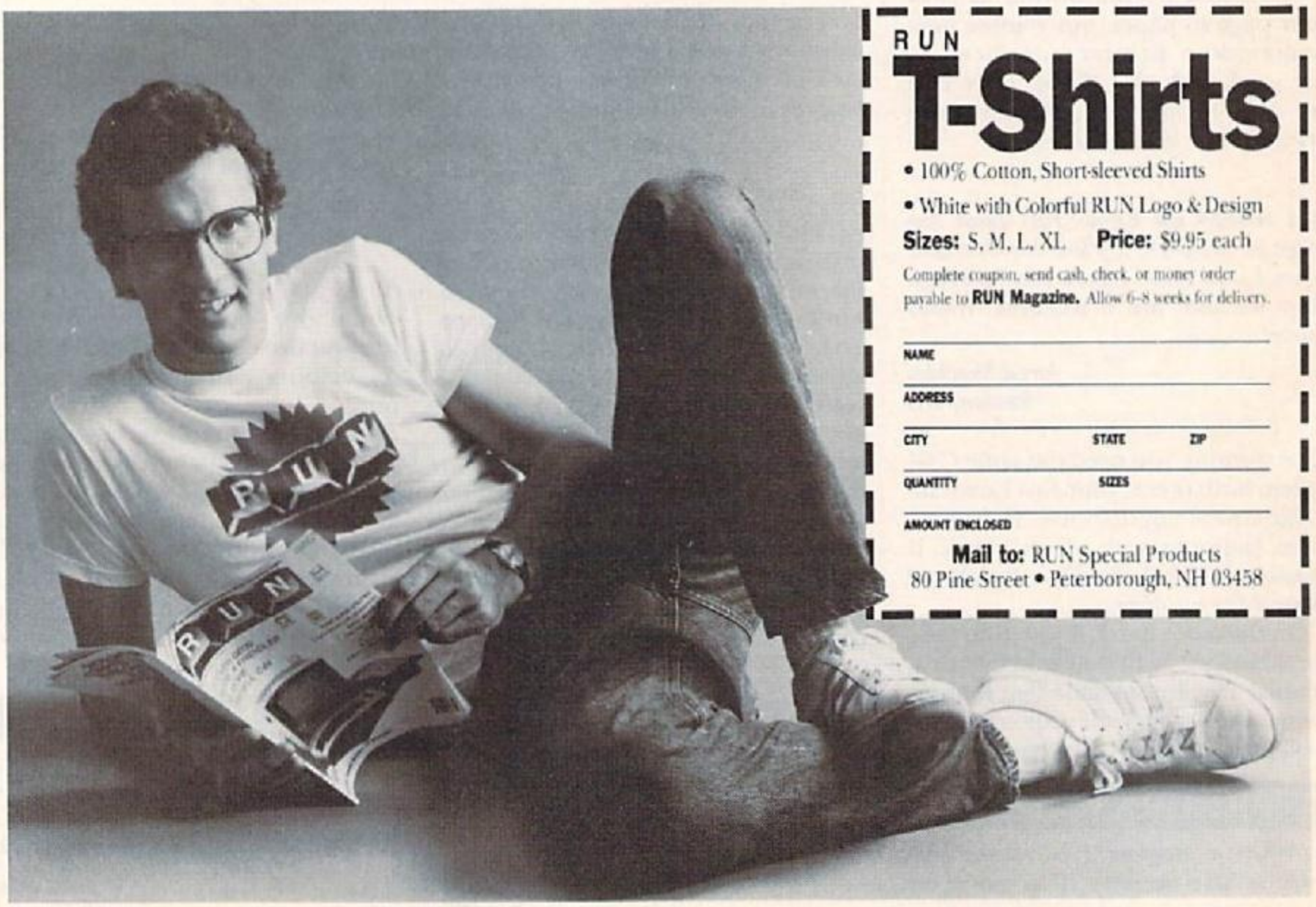
What happens from that point on is up to the members of your group, but some of the best-known and largest user groups started in just this way.

Q: I have a list of Plus/4 software Commodore gave me, and would be happy to share it. I'm also interested in belonging to or starting a Plus/4 owners club. Could you assist me in this?

R. N. Mitchell
317 Bahia Circle
Ocala, FL 32672

A: I'd be glad to. Plus/4 owners interested in forming a user group should let reader Mitchell know, and offer whatever help you are willing to provide the group.

With Plus/4s currently selling for under $80 from C.O.M.B., there soon should be plenty of new owners interested in the group.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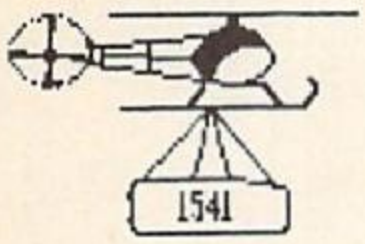

Now you can service your own disk drive with the popular program 1541 MASH. You can check and adjust the head alignment; Check and adjust the RPM's. You can also use MASH to clean your drive and check disks for errors. Complete instructions guide you step by step as you rate your drive's performance and make the necessary adjustments. All you need is a screwdriver and about an hour of your time. No knowledge of electronics is necessary. This is the easiest program of its type to use.

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User's Group by Mail?

I am a fairly new computer user and would like to learn more. *RUN* provides fine articles, but I believe a user's group would help me more, since I would be dealing with other new users like myself. However, I don't have time for the weekly club meetings in my area.

I would like to hear from others interested in starting a mail-in club for C-64 users, or anyone who already has such a club.

John Eidschun
2746 Beacon Drive
Atlanta, GA 30360

Correspond with the Philippines

We're a group of Commodore users in the Philippines who would like to exchange notes with other clubs. Our address is: Society of Commodore Users of Metro Manila, c/o Chin Wong, 29A Scout Lozano, Quezon City, Philippines.

Chin Wong
Quezon City, Philippines

RUN Script Hints

I'm absolutely delighted with RUN Script 64. I especially like being able to move among screen codes, Commodore ASCII and true ASCII.

Because the RUN Script 64 system uses a Basic loader, it's easy to lock the printer into true ASCII in the loader. For the Cardco CARD/? + G, I just added the line:

```
10 OPEN 4,4,25:PRINT# 4,"LOCK":PRINT#
   4:CLOSE 4
```

Another feature you didn't mention is that headers can be suppressed on the first page simply by putting the .hd statement elsewhere than at the beginning of the file.

Thanks for a very useful program. It has solved some printing problems, including interface "quote mode" complexities and printing of files downloaded from local bulletin boards.

Marjorie S. Hildebrandt
Simsbury, CT

Printing in Spanish

If you're using a Commodore 64 or 128 computer, a Commodore 1101 Daisywheel printer and the Paperback Writer 64 or 128 word processor, and you're trying to write in Spanish with Adler Spanish daisywheels, I'll bet you're having trouble.

The printer file for the 1101 that comes with Paperback Writer is not functional. It's adapted to write in French, so to write Spanish you have to adapt it yourself. It takes hard work and a lot of patience, but you can do it, and these pointers will give you some help. The basic steps are:

1. Load from disk the file named 1101/JUKI6000.pf.

2. First change the n to y in the line for the ASCII (the first one), and also put a 7 in the line for the address code.

3. Look for the printer codes in your 1101 printer's manual, and put the codes for the Spanish characters in your printer file.

4. Change the French symbols to Spanish symbols in the dot squares (at the end of the file).

Here's where you get into trouble. Most of the printer codes for the Adler Spanish wheels are wrong. All the combinations that include 7 on that page don't give you any character at all. Setting the DIP switches to USA or Spain won't do any good. Neither will writing to the publishers of Paperback Writer. They won't answer you, or maybe they don't know an answer.

After months of hard work, I finally found all the codes you need to write completely in Spanish, including all the Spanish symbols. With my chart of codes you don't even need to set the DIP switches to Spain. (In fact, in Spain DIP the accent doesn't work properly when writing in proportional spacing, but in USA DIP it works perfectly.)

If any readers would like the codes for the Spanish symbols, I'll send a copy of my chart for $5. For $7 I'll send a hard copy of the complete printer file with all the codes and Spanish symbols. With this you can both write in Spanish and see the Spanish characters on the screen. Finally, for $10 I'll send a disk with everything on it.

If you have an old version of Paperback Writer, you can adapt your printer file with the code chart, but if your version is the latest, your printer file doesn't have the French symbols to adapt to Spanish. In that case, you'll definitely need either the hard copy of the file or the disk.

By the way, with the Adler Spanish daisywheels you can also print in French, and I can give you the codes for the French characters in USA DIP.

José A. Alvarez
Box 7593, Sunny Isle
St. Croix, Virgin Islands

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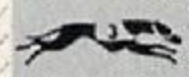

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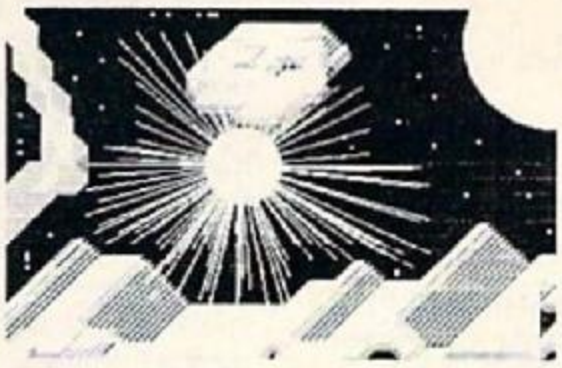

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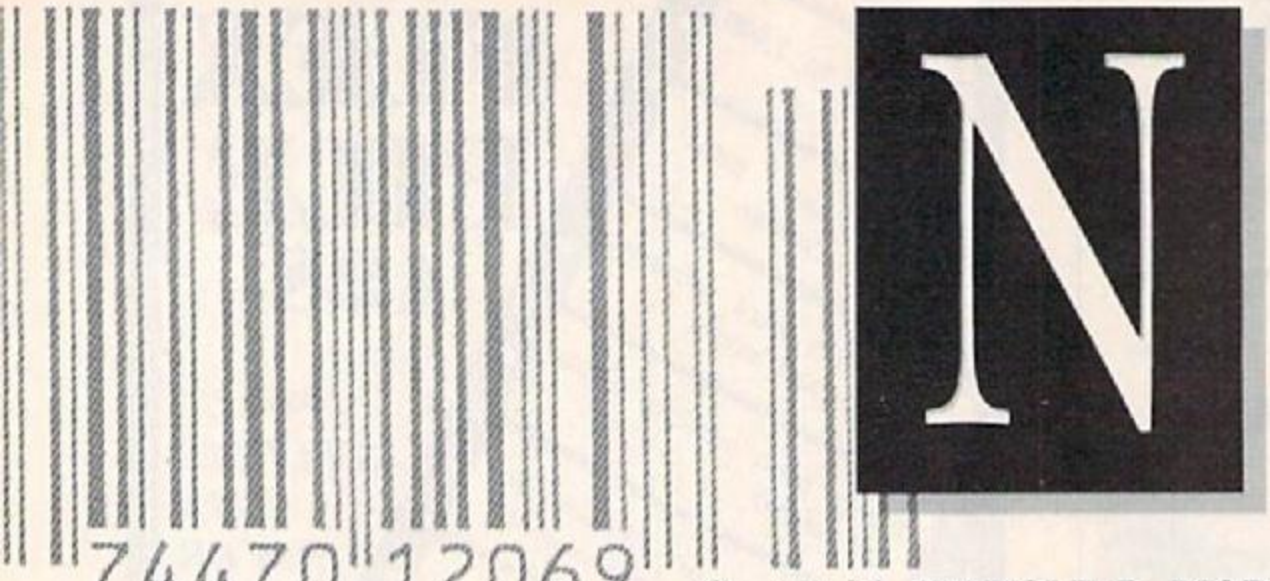


Compiled by HAROLD R. BJORNSEN

These new products were introduced by their manufacturers at the June Consumer Electronics Show in Chicago.

Right Hand Helper

Sharedata (Eden Prairie, MN 55344), introduces Z-Glove, a glove you wear that senses most common hand movements. Used in place of cursor keys and input devices, you handle objects on the screen in much the same way you would real objects. Grasp, Z-Glove's programming language, lets you change the workings of a program while it is running. Available for $39.95.

Check Reader Service number 400.

Money

Timeworks (444 Lake Cook Road, Deerfield, IL 60015) expands its Sylvia Porter's Personal Finance Series with Your Personal Investment Manager for the C-128, which manages investment transactions, monitors your investment taxes and tracks your portfolios and retirement investments. Fundamental and technical analyzers help you evaluate securities. You can also access databases such as Dow Jones News, CompuServe, The Source and Warner's Investment Strategies. Available on disk for $69.95.

Check Reader Service number 401.

Games and More Games

Eleven new games on disks for the C-64 have been announced by Electronic Arts (1820 Gateway Drive, San Mateo, CA 94404).

Solve a murder and learn your true identity in Amnesia ($39.95). Battle to the death in freeway firefights in Autoduel ($49.95). Take command in the World War II game, Battlefront ($39.95). View your chessboard in two or three dimensions with Chessmaster 2000 ($39.95). Explore the Oriental world of magic and mysticism in Moebius ($39.95). Help a cybernetic tank crush armored defenders in Ogre ($39.95). Tune in, turn on and boot up in Timothy Leary's Mind Mirror, a mind game for blowouts ($32.95). Romp through 100 levels of treacherous dungeon playfields in Ultimate Wizard ($29.95).

The prices for the following games had not been determined at press time, but they will range between $30 and $50 each. Wend your way through seven cities, with new magic spells and a new class of characters, in Arch-Mage's Tale. Host your own murder party in Murder Party, with different suspects and clues each time you play. Use robots to hunt for bizarre items in Scavenger Hunt, a part computer and part board game.

Check Reader Service number 405.

Broderbund C-64 Trio

Broderbund Software (17 Paul Drive, San Rafael, CA 94903) introduces three programs on disks for the C-64.

Design working mechanical models and toys, customize the designs and print them out with The Toy Shop. Wire, wooden dowels, adhesive cardboard and users manual are included. $59.95.

Type! teaches typing with text and sentences and includes an arcade-style game. $49.95.

Breakers is a science-fiction text adventure in a futuristic real-time world where the action continues even without your input. $39.95.

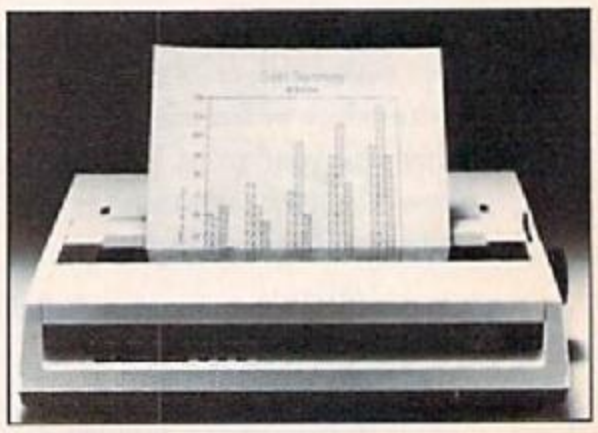
Check Reader Service number 402.

NLQ & Color Printers

Okidata (532 Fellowship Road, Mt. Laurel, NJ 08054) now offers its model 120 dot-matrix printer ($269) with near-letter-quality capabilities. The 120 has a mean-time-between-failure rating of 4000 hours.

The Okimate 20 color printer ($169) creates hi-res pictures, graphics and overheads and requires the Plug 'N Print kit ($99), which includes an interface, data cable, cartridge ribbons, computer paper and instructions.

Check Reader Service number 403.



The Okimate 120.

Stickers

Stickers, a graphics program for children of 4–12, creates "sticker" pictures while improving problem-solving skills. Available on disk for the C-64 for $34.95. Springboard Soft-

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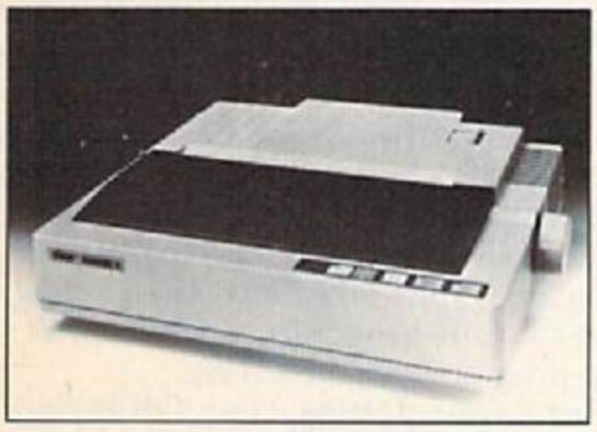
ware, Inc., 7807 Creekridge Circle, Minneapolis, MN 55435.

Check Reader Service number 406.

Death from Above

In the arcade game A.C.E.: Air Combat Emulator, a talking on-board computer warns you of incoming enemy missiles and aircraft as you guide your supersonic fighter to wipe out enemy air and ground forces and ships. Available on disk for the C-64 at $19.95 from UXB, 1 Kendall Square, Cambridge, MA 02139.

Check Reader Service number 407.



Star's Gemini II printer.

Gemini II

Star Micronics (200 Park Avenue, Suite 3510, New York, NY 10166) introduces the Gemini II, a C-64- and 128-compatible dot-matrix printer that prints 120 cps in draft mode and 30 cps in near-letter-quality mode. A snap-in ribbon cartridge and interface cable are included. Available for $329.

Check Reader Service number 404.

Fisher-Price Education

Fisher-Price Learning Software (PO Box 1327, Cambridge, MA 02238) introduces four C-64 educational programs based on children's classics, each available on disk for $24.95.

In Peter Rabbit Reading (for ages 3–6), children develop early reading skills as they help Peter Rabbit find his way through gardens, ponds and other places. Prokofiev's Peter and the Wolf Music (ages 3–7) helps children develop primary music and listening skills using characters and themes from the classic music adventure. The First Men on the Moon Math (ages 9–12) helps children to add, subtract, multiply and divide within equations. In Jungle Book Reading (ages 7–12), children test and improve their reading comprehension skills as they explore the wild with Mowgli, the jungle boy.

Check Reader Service number 408.

Tool Box

The Personal Choice Collection from Activision (2350 Bayshore Frontage Road, Mountain View, CA 94043) is a series of productivity tools on disks for the C-64.

Writer's Choice, a word processor, includes a 50,000-word spelling checker and layout-preview option that lets you see how a document will appear on hard copy. Filer's Choice, a filing and record-keeping system, lets you customize computer index cards and combine information from multiple fields into one file for reports. Planner's Choice, a personal planning and spreadsheet system, lets you select column widths and view different sections of the spreadsheet simultaneously.

Each program may be purchased separately for $39.95 or in a set for $99.95 complete.

Check Reader Service number 410.

Create Garfield Cartoons

Create cartoons featuring Garfield and his friends with Create with Garfield!, a graphics program for the C-64. Children make cartoons by selecting backgrounds and characters (Jon, Odie, Arlene, Pooky, Nermal and Garfield), setting up situations, adding built-in captions (or writing their own), and then printing out their creations as posters, cartoons or labels. Available on disk for $29.95 from DLM, One DLM Park, PO Box 4000, Allen, TX 75002.

Check Reader Service number 411.

Firebird Games

Firebird (PO Box 49, Ramsey, NJ 07446) offers two new games on disks for the C-64. Tracker has you overcoming a complex web of defenses in order to terminate the renegade artificial intelligence residing within ($34.95). Starglider is a combat simulation, with animated, 3-D vector graphics. Your mission: Destroy the space fleet of an invading planet (no price set at press time).

Check Reader Service number 412.

Survival Conference

The Association for Women in Computing (AWC) announces its Fifth Annual Conference, which will be held September 26–28, 1986, at the Embassy Suites Hotel, Laclede's Landing, St. Louis, MO. The theme of the conference is "Today's Woman: Computer Literacy for Survival."

For more information, contact AWCC'86 Conference Information, 407 Hillmoor Drive, Silver Spring, MD 20901.

RUN AMOK

Item: There is a bug in the *Digit Fidget* program (May 1986, p. 70). Numbers are not rounded properly when the rounding would cause the integer portion of the number to change. For example, if you format 2.9999 with the mask "#.##", the result is "2.00", while it should be "3.00". The following modifications should fix the problem. Change line 50120 to:

```
50120 PT=PX-INT(PX):PT=PT*10↑PC+.5:IFPT>=10↑PCTHEN PZ=1:PT$="":
      GOTO50170
```

Add the following lines:

```
50122 PT$=MID$(STR$(INT(PT)),2)
50170 IFPZ<=LEN(PR$) THENIFMID$(PR$,PZ,1)="."THEN PZ=PZ-1:GOTO50200
50180 IFPZ=LEN(PR$) THENPZ=0:GOTO50200
50190 PZ=PZ+1:GOTO50170
50200 IFPZ=0THENPE=-1:RETURN
50210 PY=VAL(MID$(PR$,PZ,1)):IFPY=9THEN50230
50220 PR$=LEFT$(PR$,PZ-1)+MID$(STR$(PY+1),2)+MID$(PR$,PZ+1):GOTO50125
50230 PR$=LEFT$(PR$,PZ-1)+"0"+MID$(PR$,PZ+1):PZ=PZ-1:GOTO50200
```

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Learn to Walk Before You RUN

We receive many letters from new Commodore owners who want to learn the first steps in using their computers. For these first-time users, we present the following step-by-step list of things that all beginners should be aware of as they start typing in programs.

1. Before you can use a fresh disk, you have to format it. First turn on your disk drive, then insert the disk, close the latch and type:

OPEN15,8,15 <Press Return>
PRINT#15,"N0:NAME,##" <Press Return>

The ## is a two-character identification number that can be any combination of letters and/or digits. "NAME" can be any title for your disk that you choose, but it must not exceed 16 characters. Wait for a few minutes while the disk spins inside the drive, being formatted. When the disk stops spinning, type:

CLOSE15 <Press Return>

C-128 owners can shorten this procedure by simply typing:

HEADER "NAME,##" <Press Return>

Caution: The formatting process erases all material already on the disk, so if you're formatting a used disk, make sure it doesn't contain any programs you want to save. See item 7, below, on reading the disk directory.

2. As a beginner, you should start entering short Basic programs. Avoid machine language listings and very lengthy Basic programs until you get the hang of what you're doing. We have a checksum program (Perfect Typist) which actually proofreads your typing and tells you when you make a mistake. You should type in Perfect Typist before you enter any programs. See directions below.

3. Remember to press the return key after each programming line you type in.

4. As you are typing in a program, you are likely to make typographical errors. To check what you have typed in, you'll need to list your program's lines on the screen. You can specify the exact lines that you want to see. Typing LIST 10–50 will list lines 10 through 50. LIST 20 will list only line 20. If you see an error in one of your listed lines, you can fix it by using the INST/DEL key and retyping the incorrect section of the line. Always press the return key after you have fixed a line.

5. Be sure to save what you have typed in before turning off your computer. To save any partial or complete Basic program listing to your disk, type:

SAVE "NAME",8 <Press Return>

C-128 owners can press F5, type in the program name, and press the return key.

Note: As you save subsequent versions of the same program, you need to make a slight change in the program name each time. You might simply add version numbers to the end of the program name (PROGRAM.1, PROGRAM.2, etc.).

6. While working on a program, you may develop several versions before you're satisfied that you have it in final form. After you *do* achieve that final version, you might want to go back and erase the old, incomplete versions from your disk. Erasing unwanted programs is called scratching. (Be sure not to erase your final version!) To scratch a program, type:

OPEN15,8,15 <Press Return>
PRINT#15,"S0:prog.name" <Press Return and wait a few seconds>
CLOSE15 <Press Return>

7. After you have saved several programs to your disk, you will need to see their names so that you can load the one you want. To get the complete list (the disk directory) of all the program names on your disk, type:

LOAD "$",8 <Press Return>

Then type LIST to actually see the directory. C-128 owners simply press F3.

8. When you know what program you want to load into your computer, type:

LOAD "NAME",8 <Press Return>

C-128 owners can just press F2, type in the program name, and press the return key.

9. After you have loaded a program, type RUN to actually use the program.

How to Type Listings from *RUN*

To simplify your typing of *RUN*'s C-64 and C-128 program listings, we include checksum numbers. These numbers follow a REM statement at the end of each line (e.g., :REM*123). These checksum numbers necessitate your using *RUN*'s Perfect Typist programs, listed below. Use 64 Perfect Typist for C-64 programs and 128 Perfect Typist for 128 Mode programs on the C-128.

Type in 64 Perfect Typist (Listing 1) or 128 Perfect Typist (Listing 2) and save it to either tape or disk before running. When you want to type in a 64- or a 128-mode program, first load and run the appropriate Perfect Typist listing. Two SYS numbers will be displayed on your screen. Jot these down and keep them handy. They are the SYS numbers that you type in for deactivating and reactivating the checksum program.

After Perfect Typist has been loaded and run, start typing in the program listing from *RUN* as you normally do. The only difference is that now, after you press the return key to log in each line, a 1-, 2- or 3-digit number will appear below the line on the left margin. This is the checksum number, ranging from 0 to 255.

If this number matches the checksum number printed in the listing after the :REM*, then you know you have typed that line correctly. Then you type the next program line right over the previous line's checksum value. If the checksum numbers do not agree, analyze your line on screen for any typographic errors or omissions. Make the needed changes and press the return key again to log in those changes. A new checksum number will appear in place of the old one. Compare this to the magazine's number and then proceed to the next line.

When you've finished typing in your program, disable the Perfect Typist by typing in the appropriate SYS number for either 64 or 128 mode, and press the return key. Now you can save your program as usual, to disk or tape. (Before you attempt to run your new program, turn your computer off and back on to completely clear out the Perfect Typist program.)

You may save an incomplete program any time and continue it later. You will have to reload and run the Perfect Typist program, then load the incompleted pro-

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gram that you were working on, list it, and continue where you left off.

The 128 Perfect Typist will work in either 40 or 80 columns. Also, it lets you use the C-128's automatic line-numbering. If Auto is on, the checksum will be printed below the line you just entered, and the C-128 will place the next line number below the checksum.

All listings in *RUN* have been translated so that the graphics and control characters are designated as understandable key combinations. When you see instructions inside curly brackets, such as {SHIFT L}, you should hold down the shift key and press the L key. What you see on your screen will look quite different from what is designated inside the brackets. Another example is {22 SPACEs}, which instructs you to press the space bar 22 times.

Listing 1. *64 Perfect Typist program.*

```
1 REM 64 PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
2Ø PG=PEEK(56):ML=PG*256+6Ø
3Ø FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
   XT
4Ø IFT<>16251 THEN PRINT"ERROR IN DATA...":
   END
6Ø POKEML+4,PG:POKE ML+1Ø,PG:POKE ML+16,PG
7Ø POKE ML+2Ø,PG:POKE ML+32,PG:POKE ML+38,P
   G
8Ø POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   ************************"
9Ø SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
   IST IS NOW ACTIVE{2 SPACEs}**"
1ØØ PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs}
    SYS"ML+3Ø"=OFF **"
1Ø1 PRINT"{CRSR RT}**********************
   ***************":NEW
11Ø DATA 173,ØØ5,ØØ3,2Ø1,ØØ3,2Ø8,ØØ1,Ø96
12Ø DATA 141,1Ø5,ØØ3,173,ØØ4,ØØ3,141,1Ø4
13Ø DATA ØØ3,162,1Ø3,16Ø,ØØ3,142,ØØ4,ØØ3
14Ø DATA 14Ø,ØØ5,ØØ3,Ø96,234,234,173,1Ø4
15Ø DATA ØØ3,141,ØØ4,ØØ3,173,1Ø5,ØØ3,141
16Ø DATA ØØ5,ØØ3,Ø96,Ø32,124,165,132,Ø11
17Ø DATA 162,ØØØ,142,24Ø,ØØ3,142,241,ØØ3
18Ø DATA 189,ØØØ,ØØ2,24Ø,Ø51,2Ø1,Ø32,2Ø8
19Ø DATA ØØ4,164,212,24Ø,Ø4Ø,2Ø1,Ø34,2Ø8
2ØØ DATA ØØ8,Ø72,165,212,Ø73,ØØ1,133,212
21Ø DATA 1Ø4,Ø72,238,241,ØØ3,173,241,ØØ3
22Ø DATA Ø41,ØØ7,168,1Ø4,Ø24,Ø72,Ø24,1Ø4
23Ø DATA Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1Ø9
24Ø DATA 24Ø,ØØ3,141,24Ø,ØØ3,232,2Ø8,2ØØ
25Ø DATA 173,24Ø,ØØ3,Ø24,1Ø1,Ø2Ø,Ø24,1Ø1
26Ø DATA Ø21,141,24Ø,ØØ3,169,Ø42,Ø32,21Ø
27Ø DATA 255,169,ØØØ,174,24Ø,ØØ3,Ø32,2Ø5
28Ø DATA 189,162,ØØ3,189,211,ØØ3,Ø32,21Ø
29Ø DATA 255,2Ø2,Ø16,247,164,Ø11,Ø96,145
3ØØ DATA Ø13,Ø32,Ø32
```

Listing 2. *128 Perfect Typist program.*

```
1 REM 4Ø/8Ø COL 128 MODE PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø FORX=512ØTO5379:READD:T=T+D:POKEX,D:NEXT

2Ø IFT<>28312 THENPRINT"{2 CRSR DNs}ERROR I
   N DATA...":END
25 A$="":IFPEEK(215)=128THENA$="{2Ø SPACEs}
   "
3Ø PRINT"{SHFT CLR}"A$"{CRSR RT}**********
   **************************"
4Ø PRINTA$"{CRSR RT}** 128 PERFECT TYPIST I
   S NOW ACTIVE **"
5Ø PRINTA$"{CRSR RT}**{2 SPACEs}SYS 512Ø=ON
   {7 SPACEs}SYS 515Ø=OFF{2 SPACEs}**"
6Ø PRINTA$"{CRSR RT}**********************
   ***************":SYS512Ø:NEW
512Ø DATA 173,ØØ5,ØØ3,2Ø1,Ø2Ø,2Ø8,ØØ1,Ø96,1
     41,Ø45
513Ø DATA Ø2Ø,173,ØØ4,ØØ3,141,Ø44,Ø2Ø,162,Ø
     43,16Ø
514Ø DATA Ø2Ø,142,ØØ4,ØØ3,14Ø,ØØ5,ØØ3,Ø96,2
     34,234
515Ø DATA 173,Ø44,Ø2Ø,141,ØØ4,ØØ3,173,Ø45,Ø
     2Ø,141
516Ø DATA ØØ5,ØØ3,Ø96,Ø32,Ø13,Ø67,14Ø,255,Ø
     19,162
517Ø DATA ØØØ,142,252,Ø19,142,253,Ø19,142,2
     54,Ø19
518Ø DATA 189,ØØØ,ØØ2,2Ø1,Ø32,24Ø,ØØ8,2Ø1,Ø
     48,144
519Ø DATA ØØ7,2Ø1,Ø58,176,ØØ3,232,2Ø8,238,1
     89,ØØØ
52ØØ DATA ØØ2,24Ø,Ø54,2Ø1,Ø32,2Ø8,ØØ5,172,2
     54,Ø19
521Ø DATA 24Ø,Ø42,2Ø1,Ø34,2Ø8,Ø1Ø,Ø72,173,2
     54,Ø19
522Ø DATA Ø73,ØØ1,141,254,Ø19,1Ø4,Ø72,238,2
     53,Ø19
523Ø DATA 173,253,Ø19,Ø41,ØØ7,168,1Ø4,Ø24,Ø
     72,Ø24
524Ø DATA 1Ø4,Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1
     Ø9,252
525Ø DATA Ø19,141,252,Ø19,232,2Ø8,197,173,2
     52,Ø19
526Ø DATA Ø24,1Ø1,Ø22,Ø24,1Ø1,Ø23,141,252,Ø
     19,169
527Ø DATA Ø42,Ø32,241,Ø2Ø,Ø32,188,Ø2Ø,16Ø,Ø
     Ø2,185
528Ø DATA 185,Ø2Ø,Ø32,241,Ø2Ø,136,Ø16,247,1
     65,116
529Ø DATA 2Ø8,ØØ9,165,117,2Ø8,ØØ5,169,145,Ø
     32,241
53ØØ DATA Ø2Ø,172,255,Ø19,Ø96,Ø13,Ø32,Ø32,1
     62,ØØØ
531Ø DATA 173,252,Ø19,232,Ø56,233,1ØØ,176,2
     5Ø,1Ø5
532Ø DATA 1ØØ,2Ø2,24Ø,ØØ3,Ø32,232,Ø2Ø,2Ø1,Ø
     1Ø,176
533Ø DATA ØØ5,2Ø5,252,Ø19,24Ø,Ø15,162,ØØØ,2
     32,Ø56
534Ø DATA 233,Ø1Ø,Ø16,25Ø,Ø24,1Ø5,Ø1Ø,2Ø2,Ø
     32,232
535Ø DATA Ø2Ø,17Ø,Ø72,138,ØØ9,Ø48,Ø32,241,Ø
     2Ø,1Ø4
536Ø DATA Ø96,17Ø,173,ØØØ,255,Ø72,169,ØØØ,1
     41,ØØØ
537Ø DATA 255,138,Ø32,21Ø,255,1Ø4,141,ØØØ,2
     55,Ø96
```

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- **Type-in Balance Sheet**—C-64 and C-128 owners can use this program to keep accurate, up-to-date financial records for their small business or organization.
- **Software Reviews**—Find out what's available commercially to help you with your business needs.
- **Applications**—Read about how Commodore computers are effectively being used in business every day.

Plus, some non-business features:

- **Jim Butterfield Interview**—A profile of the guru of Commodore computing, who has devoted years to learning, and teaching others, about Commodore computers.
- **Introducing Big Magic**—We're expanding *RUN*'s most-read column to include longer—yet still easy-to-type-in—program listings to help you get the most out of your computer system.

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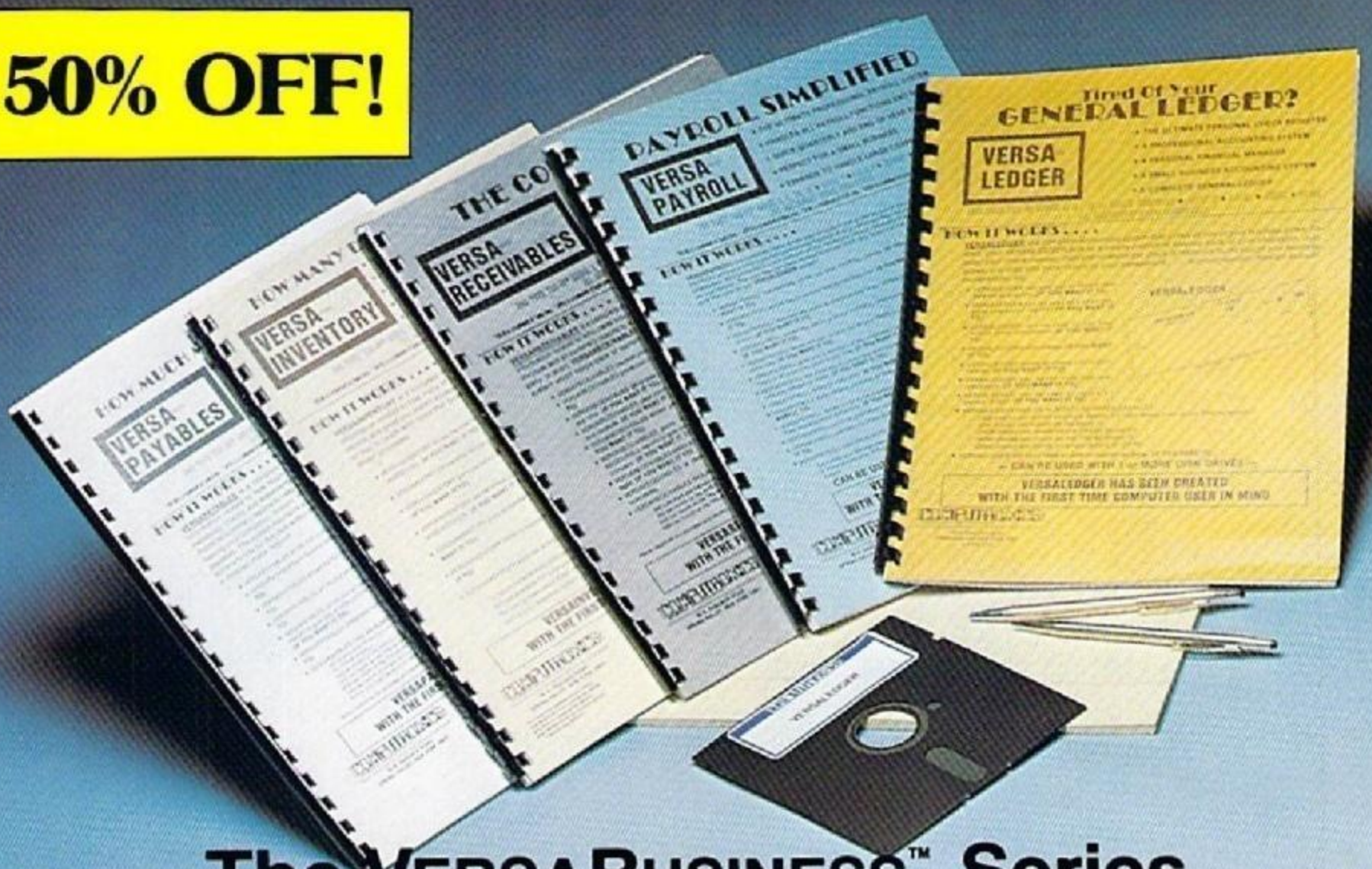

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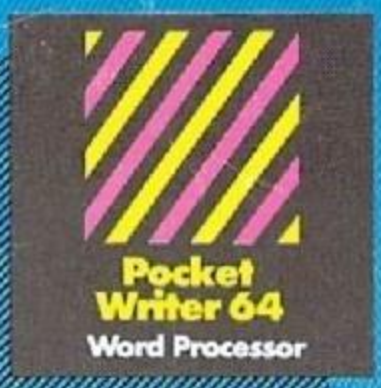

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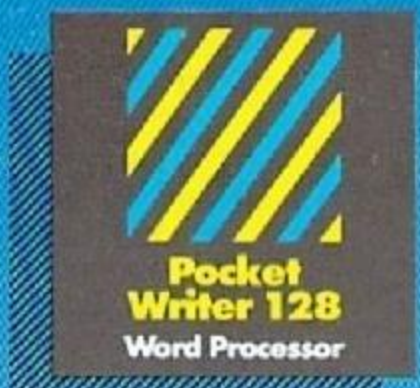

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